FEDERAL ON-SCENE COORDINATOR'S REPORT
FOR THE
CAPITOL HILL SITE
WASHINGTON, DC

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 3
PHILADELPHIA, PENNSYLVANIA

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ACRONYMS AND ABBREVIATIONS

AOC	Architect of the Capitol
ADM	Admiral
ATSDR	Agency for Toxic Substances and Disease Registry
AHU	Air handling unit
B. subtilis	*Bacillus subtilis*
B. stearothermophilus	*Bacillus stearothermophilus*
B. thuringiensis	*Bacillus thuringiensis*
B. cereus	*Bacillus cereus*
B. anthracis	*Bacillus anthracis,* anthrax
CAPT	Captain
CID	Criminal Investigation Division
ClO_2	Chlorine dioxide
COC	Chain of custody
COL	Colonel
CDC	Centers for Disease Control
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
Cipro	Ciprofloxacin hydrochloride
CBIRF	U.S. Chemical and Biological Incident Response Force
CVC	Capitol Visitor Center
CPB	Capitol Police Board
CPBS	Capitol Police Bomb Squad
CDR	Commander
CRZ	Contamination Reduction Zone
DARPA	Defense Advanced Research Projects Agency
DOJ	Department of Justice
DOT	Department of Transportation
DoD	Department of Defense
DFU	Dry filter unit
DMAT	Disaster Medical Assistance Team
E&E	Ecology & Environment
EPA	U.S. Environmental Protection Agency
ERRS	Emergency and Rapid Response Services
ERT	Environmental Response Team
EtO	Ethylene oxide
FBI	Federal Bureau of Investigation
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency

GIS	Geographic information system
GEN	General
GSA	General Services Administration
HCl	Hydrochloric acid
HEPA	High efficiency particulate arresting
HVAC	Heating, ventilation, and air-conditioning
HASP	Health and Safety Plan
IAP	Incident Action Plan
IATA	International Air Transport Association
ICS	Incident Command System
IH	Industrial Hygienist
ISO	International Organization for Standardization
LCDR	Lieutenant Commander
LT	Lieutenant
MAJ	Major
MD	Medical doctor
NaOCl	Sodium hypochlorite
$NaClO_2^-$	Sodium chlorite
NIIMS	National Interagency Incident Management System
NIOSH	National Institute for Occupational Safety and Health
NMRC	U.S. Navy Medical Research Center
NC	Negative control
NRT	National Response Team
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PPE	Personal protective equipment
PAPR	Powered air-purifying respirator
PHS	Public Health Services
ppb	Parts per billion
ppm	Parts per million
ppmv	Parts per million volume
PVC	Polyvinyl chloride
POTW	Publicly owned treatment works
QA	Quality assurance
QC	Quality control
RADM	Rear Admiral
RCRA	Resource Conservation and Recovery Act

SCS	Silva Consulting Services
SOP	Standard operating procedure
START	Superfund Technical Assessment and Response Team
SwRI	Southwest Research Institute
SCBA	Self-contained breathing apparatus
TAGA	Trace air and gas analyzer
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USPS	U.S. Postal Service

FACT SHEET

SITE NAME:	Capitol Hill Site
SIZE:	26 locations in the Capitol Hill Area, encompassing over seven million square feet
LOCATION:	Washington, DC
PROJECT DATES:	October 15, 2001 through May 2002
DESCRIPTION:	The Capitol Hill Site initially consisted of 26 buildings with suspected anthrax contamination. All 26 buildings were sampled; anthrax was detected in seven buildings, all of which were decontaminated and cleared for re-entry after confirmation sampling. Chlorine dioxide (ClO_2) liquid, Sandia foam and high efficiency particulate arresting (HEPA) vacuums were used to decontaminate surfaces in office suites and mail handling areas. ClO_2 gas was used to fumigate Senator Tom Daschle's suite and the heating, ventilation, and air-conditioning (HVAC) system inside the Hart Senate Office Building (Hart Building). Prior to decontamination, critical items were removed from the contaminated areas and transported off-site for sterilization using ethylene oxide (EtO) gas, after which they were returned to their respective owners. The Capitol Hill Site response was different from most responses in terms of its size, complexity, and nature of contamination. The response involved the coordination of over 50 organizations and required a large amount of personnel and resources. This response was the first at which EPA was faced with anthrax contamination inside buildings; therefore, available decontamination technologies were limited.
HAZARDOUS MATERIALS:	Anthrax (*Bacillus anthracis*); anthrax is a disease-causing biological agent.
QUANTITIES REMOVED:	300,000 pounds of classified material, personal protective equipment (PPE) and medical waste 700 metal drums 14,235 gallons of waste water 3,200 bags of critical items (removed, sterilized, and returned) 4,000 mail packages
QUANTITIES DECONTAMINATED:	Trillions of anthrax spores

OSC:	Richard Rupert, U.S. EPA Region 3
REMOVAL CONTRACTOR:	Numerous (see Table 2.2)
TREATMENT LOCATIONS:	On-site treatment at seven Buildings in the Capitol Hill area Off-site treatment at Sterilization Services in Richmond, VA United States Department of Agriculture (USDA) Research Center in Beltsville, Maryland
DISPOSAL LOCATIONS:	Fort Detrick, Maryland Medical waste incinerator in Norfolk, Virginia Steam decontamination at a facility in Micromet, Florida

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On-Scene Coordinator - Richard Rupert

FOREWORD

The On-Scene Coordinator (OSC), as mandated by the National Oil and Hazardous Substance Contingency Plan, Title 40 of the Code of Federal Regulations (NCP 1990), is required to provide a coordinated federal response capability at the scene of an unplanned or sudden discharge of oil or hazardous substance that poses a threat to the public health or the environment. In addition, the provisions of Section 106 of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), promote a coordinated federal, state, and local response to mitigate situations at sites that pose an imminent and substantial threat to public health and/or the environment.

Conditions at the Capitol Hill Site presented an imminent and substantial risk of harm to human health and the environment due to the uncontrolled release of a hazardous substance to the environment, thereby providing a legal basis for federal response activities. Therefore, the provisions of the NCP at Section 300.415 were implemented by the U.S. Environmental Protection Agency (EPA), Region 3, Philadelphia, Pennsylvania to support a removal action at the site.

The OSC would like to extend thanks to all of the agencies and individuals who provided valuable assistance and expertise to ensure the successful completion of this removal action.

Richard Rupert
On-Scene Coordinator
EPA Region 3
Philadelphia, Pennsylvania

1.0 INTRODUCTION

This introduction provides an overview of the Capitol Hill Site response. It presents the initial situation, describes the site location, summarizes the lessons learned from the response, and presents recommendations for consideration in managing a similar response.

Section 2.0 lists contact information for the various agencies and organizations involved during the response. Section 3.0 presents a chronology of major events for each building decontaminated during the response, including major decisions that were made and plans that were developed. Time lines are presented for each of the seven contaminated buildings to provide conceptual representations of the major events that took place. Section 4.0 provides an explanation of how the response was organized into major activity areas, each represented by its own subsection. Each subsection presents the major milestones, difficulties, successes, lessons learned, and recommendations that were associated with each major activity area. Section 5.0 discusses the three overarching recommendations that were developed based on many lessons learned during the response.

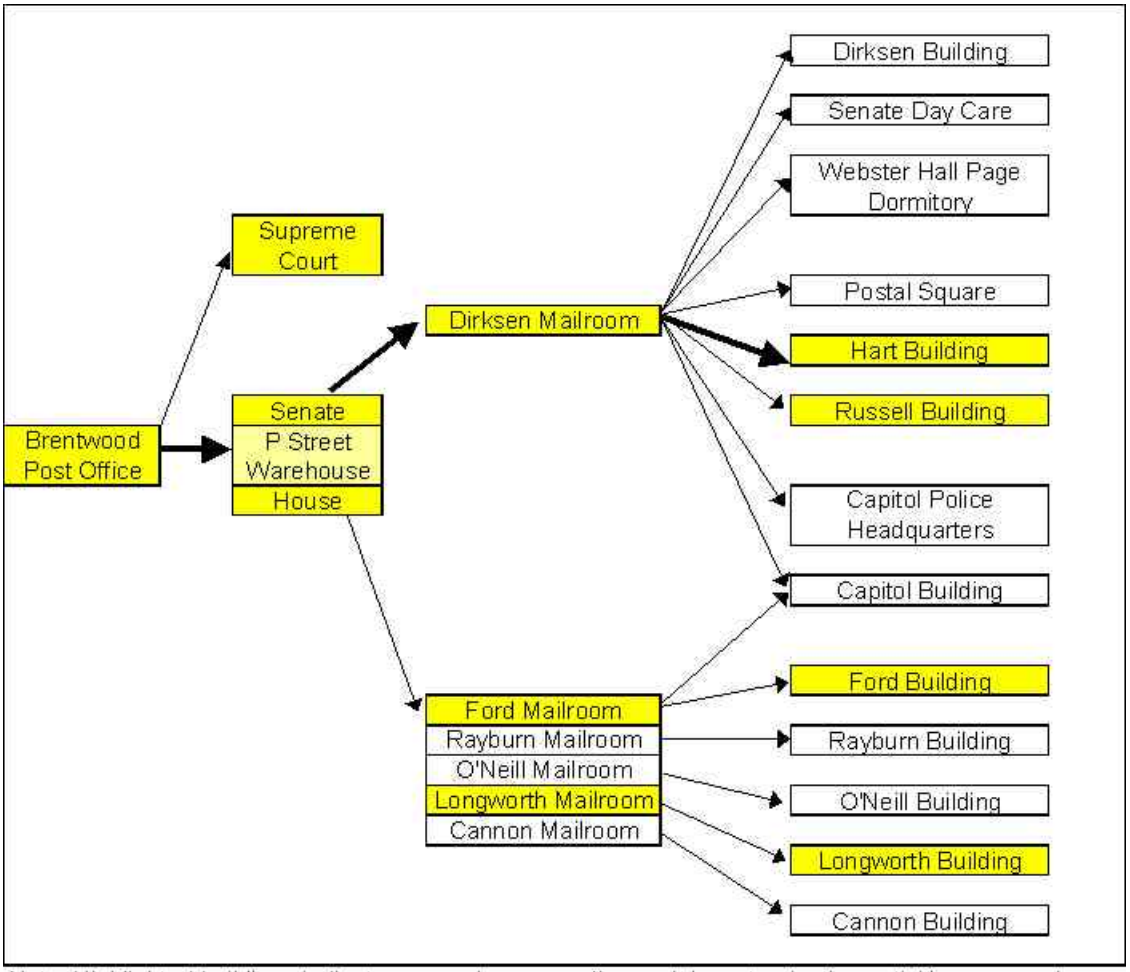
1.1 Initial Situation

Many responders did not fully appreciate the exigencies of the Capitol Hill Site response. The response was unique in threat being a biological agent, rather than a hazardous substance and the clients were the legislative branch of government: essentially multiple decision-makers, with independent and high levels of authority. Additionally, it was of the upmost importance to return the affected clients to their offices as soon as possible because they were needed to, among other things, formulate America's response to terrorist attacks of 9/11. Though relocating these individuals would have been a preferred option, due to security considerations, available space and the shear effort involved in relocating 50 Senators, the most appropriate alternative was to complete the clean-up of the affected structures as soon as possible.

A letter containing a significant quantity of weapons-grade anthrax (*Bacillus anthracis*) was opened on Monday, October 15, 2001, on the sixth floor of the Hart Senate Office Building (Hart Building) in room RM-SH612 of Senator Tom Daschle's suite. The Capitol Police were notified and responded first to the scene. The Capitol Police Bomb Squad (CPBS) responded in Level C personal protective equipment (PPE), sampled the letter and its contents with "bio tickets," and noted a positive result after a few minutes (Note: "bio tickets" are effective indicators of gross contamination from concentrated sources of biological agents such as those contained in the letter). The Federal Bureau of Investigation (FBI) obtained the letter as evidence for a criminal investigation. On October 16, the U.S. Environmental Protection Agency (EPA) was notified and On-Scene Coordinator (OSC) Richard Rupert mobilized to the scene. FBI investigators suspected that more letters had been sent and were already in the mail system. The EPA's Criminal Investigation Division (CID) arrived on-site to assist the FBI with evidence retrieval and further investigation. EPA mobilized Superfund Technical Assessment and Response Team (START) and Emergency and Rapid Response Services (ERRS) contractors to the scene to conduct monitoring, sampling, containment, and cleanup and to provide technical support to EPA.

In the first attempt to identify additional areas that may have been contaminated with anthrax, FBI investigators traced the delivery route of congressional mail. Figure 1.1 shows the delivery routes for mail throughout the Capitol Hill area.

Figure 1.1: Delivery Route for Mail in the Capitol Hill Area



Note: Highlighted buildings indicate areas where sampling and decontamination activities occurred. The bolded lines indicate the path of the anthrax-contaminated letter addressed to Senator Daschle.

Initial sampling was conducted along the mail route by following the mail to the mail carts and through the mail slots in the Hart Building. The mail route was traced back from the Hart Building to the Dirksen Senate Office Building (Dirksen Building; where the mail for the Senate is processed) to the P Street Warehouse (a restricted mail inspection facility overseen by the Capitol Police, where Senate and House mail is inspected) and finally to the Brentwood Post Office (the U.S. Postal Service [USPS] mail processing and distribution center for Washington, DC). EPA sampled 26 locations in the Capitol Hill area that were potentially contaminated with anthrax, including congressional buildings, mail facilities, nearby buildings (such as the Library of Congress), and other locations in the area. These locations are listed below:

Senate Office Buildings

- Dirksen Building
- Hart Building
- Russell Senate Office Building (Russell Building)

House Office Buildings

- Cannon House Office Building (Cannon Building)
- Ford House Office Building (Ford Building)
- Longworth House Office Building (Longworth Building)
- O'Neill House Office Building (O'Neill Building)
- Rayburn House Office Building (Rayburn Building)

Other Locations

- Botanical Gardens
- Capitol Visitor Center (CVC) Trailer
- Capitol Police Headquarters
- Daniel Webster Page Dormitory
- DC Village
- Emergency Operation Center
- U.S. Government Printing Office
- House Page Dormitory
- James Madison Building (Library of Congress)
- John Adams Building (Library of Congress)
- P Street Warehouse
- Postal Square
- Saint Cecilia Pre-School
- Senate Child Care Center
- Supreme Court Building
- Thomas Jefferson Building (Library of Congress)
- Thurgood Marshall Federal Justice Building
- U.S. Capitol Building

Some locations listed above are not identified in Figure 1.1; these locations were sampled because the FBI and EPA suspected that the anthrax from the original letter may have spread to these areas in trace amounts through mail or human contact. EPA confirmed that the mail delivery route for the specific letter had been contaminated, and that the contamination extended beyond the mail route of the anthrax-contaminated letter, to include five additional offices in the Hart Building, as well as offices in several other House and Senate Office Buildings and the main

mail distribution center for Senate and House mail. Of the original 26 sampled locations, seven buildings were contaminated with anthrax, as listed below.

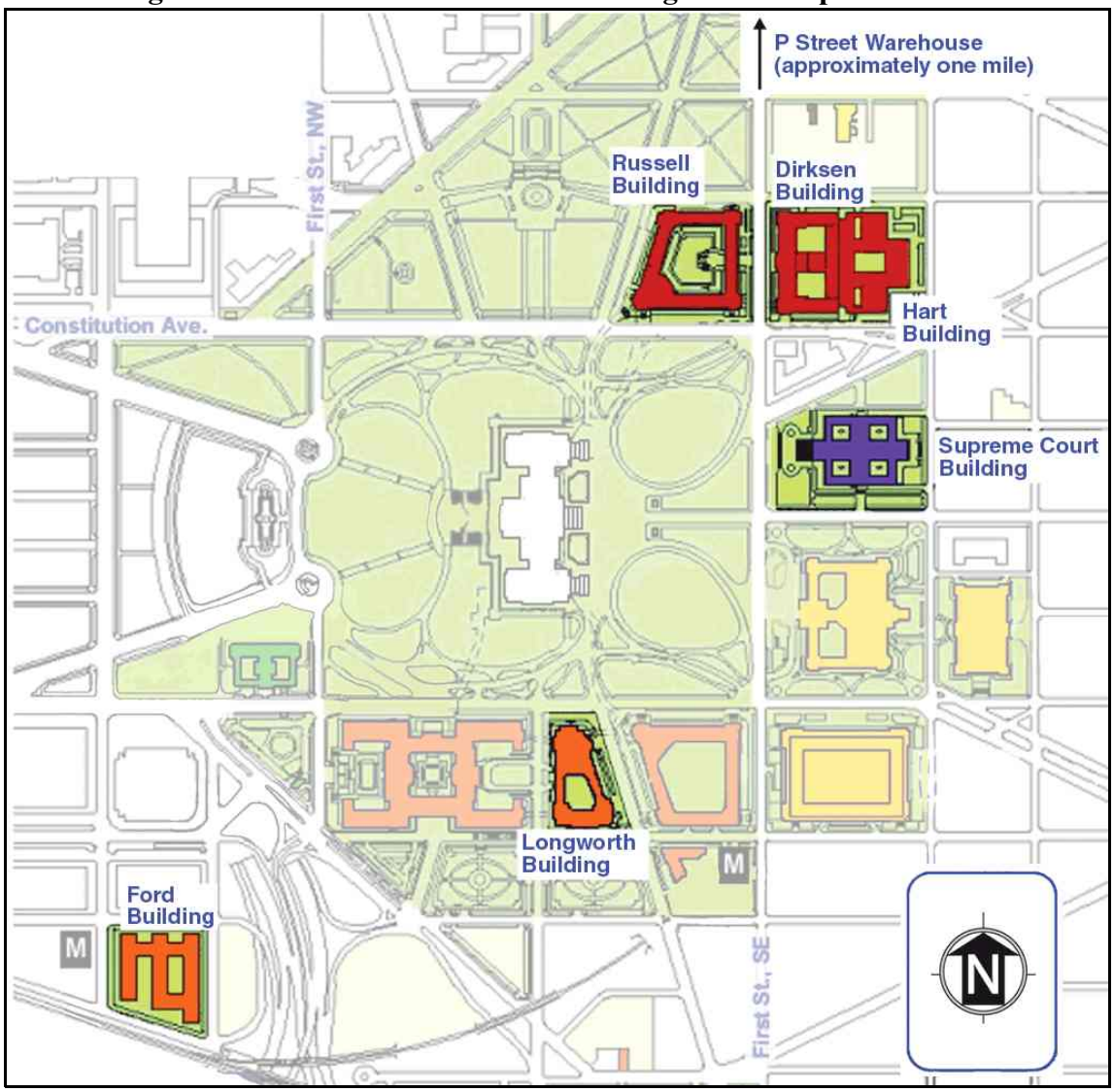
- P Street Warehouse
- Supreme Court Building
- Dirksen Building
- Ford Building
- Hart Building
- Longworth Building
- Russell Building

The spore load from the original letter was estimated to contain over a trillion anthrax spores. These spores were determined to include weapons-grade anthrax and presented an imminent and substantial risk, therefore warranting a removal action.

1.2 Site Location

The Capitol Hill Site includes 26 buildings located near the U.S. Capitol Building (shown in the center of Figure 1.2) and located on Constitution Avenue, between First Street NW and First Street SE. By early November, the results of initial assessments indicated that decontamination was necessary at the seven contaminated buildings listed above. These seven buildings are shown in Figure 1.2.

Figure 1.2: Seven Contaminated Buildings of the Capitol Hill Site



1.3 Major Lessons Learned and Recommendations

The Capitol Hill Site response was different from most hazardous materials emergency responses in terms of its size, complexity, and nature of contamination. During the response, EPA collected approximately 10,000 samples in various rooms from 26 locations in the Capitol Hill area. The response involved the coordination of over 50 organizations and mobilized an unprecedented amount of personnel and resources. EPA has never before addressed anthrax contamination in buildings, and available decontamination technologies were limited.

From the many activities associated with this response, the EPA OSCs that were involved have developed three primary recommendations for improving future responses:

1. Develop a core group of personnel from multiple agencies, adopt an Incident Command System (ICS) and jointly train the group on the procedures of that ICS; this core group would be dedicated and available to respond to future criminal acts, terrorist acts, or national emergencies involving nuclear, biological, and/or chemical materials.

2. Extend indemnification provisions currently available to Department of Defense (DoD) and Federal Emergency Management Agency (FEMA) to EPA for specific responses involving criminal acts, terrorist acts, or national emergencies in order to facilitate contractor mobilization and participation.

3. Improve the efficiency and effectiveness of internal communication by Incident Command leaders and among EPA OSCs during large, long-term, multi-agency responses.

These overarching recommendations are further discussed in Section 5.0.

2.0 ROSTER OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS

This section provides contact information for EPA personnel and various other organizations that were involved in the response.

2.1 Names and Contact Information for EPA Personnel

Table 2.1 provides the names and contact information for the EPA OSCs and other EPA emergency response personnel. Individuals are listed alphabetically by last name.

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Arena, Joe	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-505-5251
Augustyn, Jim	EPA Region 5 25089 Center Ridge Road Westlake, OH 44145 440-250-1742
Barber, Tony	EPA Region 10 1200 Sixth Avenue Seattle, WA 98101 206-553-2136
Bowie, April	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3119
Boyle, Patrick	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5533
Burke, Mike	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 410-267-5740

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Callaghan, Mark	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7214
Caprita Barb	EPA Region 4 61 Forsyth Street, 11th Floor Atlanta, GA 30303 404-562-8720
Carney, Dennis	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-275-9990
Caspar, Sarah	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3283
Caterino, Cosmo	EPA Region 1 1 Congress Street - Suite 1100 Boston, MA 02114 617-918-1264
Charters, Dave	EPA Facilities 2890 Woodbridge Avenue Edison, NJ 08837 732-906-68245
Condon, Tom	EPA Region 1 1 Congress Street - Suite 1100 Boston, MA 02114 617-918-1206
Davis, Joe	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7909
Deitzel, Carrie	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5525
Dollhopf, Ralph	EPA Region 5 9311 Groh Road Grosse, MI 48138 734-692-7682

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Downie, Jack	EPA Region 3 303 Methodist Building Wheeling, WV 26003 304-234-0255
Durno, Mark	EPA Region 5 25089 Center Ridge Road Westlake, OH 44145 440-250-1743
Easton, Marjorie	EPA Region 3 303 Methodist Building Wheeling, WV 26003 304-234-0251
Eble, Deborah	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5199
Fang, Sharon	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-327-0895
Fetzer, Richard	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 610-861-2087
Fisher, Charles	EPA Region 6 1445 Ross Avenue, Suite 1200 Dallas, TX 75202 214-665-2224
Fitzsimmons, Charles	EPA Region 4 4930 Old Page Road Research Triangle Park, NC 27709 919-541-1939
Fleming, Patricia	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-275-9765
Fox, Douglas	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-275-9765

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Fredricks, Scott	EPA Headquarters Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460 703-603-8771
Gaffney, Kristeen	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2092
Garvey, Dan	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7600
Gilbert, John	EPA Office of Research and Development 26 West Martin Luther King Drive Cincinnati, OH 45268 513-569-75377
Gray, Marshall	EPA Region 4 4930 Old Page Road Research Triangle Park, NC 27711 919-541-4303
Grohs, Bethany	EPA Environmental Response Team 2090 Woodbridge Avenue Edison, NJ 18837 732-906-6168
Griswold, Hays	EPA Region 8 999 18th Street, Suite 500 Denver, CO 80202 303-312-6809
Ham, Greg	EPA Region 3 1650 Arch Street Philadelphia, PA 19103-2029 215-814-3184
Hayes, Scott	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7670
Haworth, Richard	EPA Region 1 1 Congress Street, Suite 1100 Boston, MA 02114 617-918-1229

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Heister, Daniel	EPA Region 10 811 SW Sixth Avenue Portland, OR 97132 503-326-6869
Helbert Susan	EPA CID Headquarters Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460 703-235-1114
Henry, Joan	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3247
Heston, Gerald	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3273
Hirsh, Steve	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3352
Jarvela, Steve	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3259
Jones, Nancy	EPA Region 6 1445 Ross Avenue, Suite 1200 Dallas, TX 75202 214-665-8041
Kelly, Jack	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3112
Kleeman, Charles	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3257
Kotsch, Donna	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5529

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Lafferty, Shawn	EPA Region 4 4930 Old Page Road Research Triangle Park, NC 27711 919-541-1957
Lapsley, Glen	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3279
Lesnick, Keith	EPA Region 5 77 W Jackson Boulevard Chicago, IL 60604 312-886-7189
Liverman, Earl	EPA Region 10 1200 Sixth Avenue Seattle, WA 98101 206-696-3061
Macdonald, Jim	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7767
Marzulli, Linda	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3256
Matlock, Dennis	EPA Region 3 303 Methodist Building Wheeling, WV 26003 304-234-0284
Matta, Christian	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2317
McDonald, Jim	EPA Headquarters 1200 Pennsylvania Avenue, NW Washington, DC 20460 703-603-8761
Meade, Eric	EPA Environmental Effects Research Laboratory 6201 Cogdon Blvd Duluth, MN 55804 218-529-5017

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Mickunas, Dave	EPA Facilities 2890 Woodbridge Avenue Edison, NJ 08837 732-906-6913
Mitkus, Robert	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5702
Moore, Tony	EPA Region 4 61 Forsyth Street, 11th Floor Atlanta, GA 30303 404-562-8756
Mullins, James	EPA Region 6 1445 Ross Avenue, Suite 1200 Dallas, TX 75202 214-665-2273
Murray, Lorrie	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5304
Nabasny, Gail	EPA Region 5 77 W Jackson Boulevard Chicago, IL 60604 312-353-1056
Negron, Jose	EPA Region 4 61 Forsyth Street, 11th Floor Atlanta, GA 30303 404-386-4657
Nold, Eric	EPA Region 7 901 North Fifth Street Kansas City, KS 66101 913-551-7488
Piper, Bonnie	EPA Headquarters 1200 Pennsylvania Avenue, NW Washington, DC 20460 202-564-4355
Powell, Martin	EPA Headquarters 1200 Pennsylvania Avenue, NW Washington, DC 20460 202-566-1932

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Rovira-Lizardi, Eduardo	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3436
Rupert, Richard	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2879
Ryan, Mike	EPA Region 6 10625 Fallstone Road Houston, TX 77099 281-983-2241
Schaul, Peter	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3183
Smith, Melvin	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3144
Sternberg, David	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5548
Stroud, Fred	EPA Region 4 61 Forsyth Street, 11th Floor Atlanta, GA 30303 404-562-8751
Sturgeon, Randy	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3227
Stanich, Ted	EPA CID Headquarters 1200 Pennsylvania Avenue, NW Washington, DC 20460 202-564-2556
Tate, Rita	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3424

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Taurino, Mike	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3371
Towle, Mike	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3272
Turpin, Rod	EPA Facilities 2890 Woodbridge Avenue Edison, NJ 08837 732-321-6741
Voltaggio, Tom	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2900
Wagner, Christine	EPA Region 3 629 East Main Street Richmond, VA 23219 804-833-9440
Way, Steven	EPA Region 8 999 18th Street, Suite 500 Denver, CO 80202-2466 303-312-6723
Weden, Christopher	EPA Region 10 75 Hawthorne Street San Francisco, CA 94105 415-972-3041
Weisburg, Skip	EPA Headquarters 1200 Pennsylvania Avenue, NW Washington, DC 20460 410-305-2681
Weis, Christopher	EPA Region 8 999 18th Street, Suite 500 Denver, CO 80202-2466
Welsh, Mike	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-859-2255

Table 2.1: Roster of EPA Personnel

EPA OSC/Emergency Response Person	Contact Information
Williamson, Carter	EPA Region 4 61 Forsyth Street, 11th Floor Atlanta, GA 30303 404-562-8742
Wright, Anita	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3258
Wright, Dave	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-3293
Wright, James	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-363-6966
Wuenschel, Ruth	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-5540
Zenone, Vince	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-353-3956
Zickler, Mike	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2792
Zintak, Leonard	EPA Region 3 1650 Arch Street Philadelphia, PA 19103 215-814-2792
Zownir, Andy	EPA Environmental Response Team 2090 Woodbridge Avenue Edison, NJ 18837 732-321-6744

2.2 Names and Contact Information for Organizations

Table 2.2 includes the contact information and a brief description of the duties for each organization involved in the response.

Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
Federal (see Table 2.1 for List of OSCs & Emergency Response Person)		
Agency for Toxic Substance & Disease Registry (ATSDR) 1650 Arch Street Philadelphia, PA 19103	Charles J. ("Bucky") Walters	Provided on-site technical support regarding sampling techniques.
American Red Cross National Capitol Chamber Washington, DC 20472	Not Applicable	Provided early support supplying food and emergency supplies.
Centers for Disease Control (CDC), National Institute for Occupational Safety and Health (NIOSH) 1600 Clifton Road, NE Atlanta, GA 30333	Peter Kowalski Matt Gillian Dr. Cindy Freidman	Provided sampling approach and oversight of sampling activities. Aided with building clearances.
Chemical Biological Incident Response Force (CBIRF) United States Marine Corps Indian Head, MD 20640	MAJ Dahart CAPT Bob Lukowski	Biological Sampling, Mail Removal, and Furniture Removal
Federal Bureau of Investigation (FBI) National Capitol Response Squad/Joint Terrorism Task Force Washington, DC	Chris Combs Jim Rice	Retrieved mail from Senate and House mail rooms to be used as evidence.
Federal Emergency Management Agency (FEMA) 500 C Street, S.W. Washington, DC 20472	Linda Norberg-Peterson Jason McNamara	One of the first responders to the scene. Provided expert advice regarding early planning of the response.
House Sergeant-at-Arms Washington, DC	William Livingood	Alternated with the Senate Sergeant-at-Arms to manage the response.
Occupational Safety and Health Administration (OSHA) Program Support Division 1781 South 300 West Salt Lake City, UT 84115	Robert A. Curtis	Provided technical expertise during the initial stages of the response.

Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
Office of the Architect of the Capitol (AOC) Washington, DC	Mark Sciarratta	Union of architects, engineers, and workers in charge of maintenance at the Capitol. Provided reconnaissance information, such as diagrams and keys to the buildings. Provided assistance following decontamination.
Office of Senate Curator U.S. Capitol Room S-41 Washington, DC 20510	Melinda Smith	Assisted contractors with properly containing and decontaminating critical artwork.
Senate Sergeant-at-Arms	MAJ GEN Alfonso E. Lenhardt, U.S. Army (Ret.)	Alternated with the House Sergeant-at-Arms to manage the response.
U.S. Army Center for Health Promotion and Preventative Medicine (CHPPM) 5158 Blackhawk Road Aberdeen Proving Ground, MD 21010	MAJ Anthony (Tony) Intreipdo	Assisted with sampling and decontamination activities.
U.S. Coast Guard (USCG) National Strike Force	CDR Gail Kulisch LT Dave Reinhard LT Shawn Cody Lootens LCDR Nathan Knapp Daniel E. Fromer	• Conducted tactical entries • Provided entry team oversight • staffed critical incident management positions
Local		
U.S. Capitol Police Washington, DC	Deputy Chief James Rohan LT Dan Nichols CAPT Frank Ziemba LT Wes Mahr	Provided oversight for all activities in coordination with the USCG.
Washington, DC Emergency Management Agency 2000 14th Street, NW 8th floor Washington, DC 20009	Peter LaPorte Jo'Ellen Countee	Point of contact for the local government
Washington, DC Department of Health 1350 Pennsylvania Ave., NW Washington, DC 20004	Bernie Bloom	Part of the Incident Command Structure. Assured the health and safety of the District's neighborhood residents.

Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
Contractors		
ERRS Contractors		
Earth Tech 7870 Villa Park Road, Suite 400 Richmond, VA 23228	Ann-Alyssa King Senior Earth Tech Representative	Conducted sampling and decontamination activities throughout the response.
Environmental Quality Management, Inc. (EQM) 25661 Fort Megis Road, Suite A Perrysburg, OH 43551	Eric Bowman	Provided sampling and decontamination support throughout the response.
Guardian 1280 Porter Road Bear, DE 19701	Terry Boos	Provided sampling and decontamination support.
HMHTTC Response Team Inc. P.O. Box 3464 Baltimore, MD 21225	Sean P. Jensen John Lang	Provided decontamination support.
IT Corporation 200 Horizon Boulevard Trenton, NJ 08691	Stan Gable Brian Roebuck John Gallimore Steve Petty	Provided on-site support in all aspects of decontamination support, including sampling, decontamination, and critical item removal.
Kemron Environmental 1300 Spring Street, NW Atlanta, GA 30309	Neville Kingham Steven G. Hall	Provided sampling and decontamination support, as well as oversight of the fumigation events.
START Contractors		
CDM Federal Programs Corp. 993 Old Eagle School Road Suite 408 Wayne, PA 19087	Michael Grasso	Oversight of preparation, handling, placement, and collection of spore strips used during fumigation with chlorine dioxide (ClO_2) gas and ethylene oxide (EtO) gas.
Ecology & Environment (E&E) 131 Peninsula Street - Suite B Wheeling, WV 26003	Brian Burris	Assisted with sampling documentation and plans.
Tetra Tech EMI 709 Chelsea Parkway Boothwyn, PA 19061	William Hagel	Provided sampling and decontamination support.
Weston Inc. One Weston Way West Chester, PA 19380	Ralph Shapot Bob McGlade	Provided sampling and decontamination support.

Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
Other Contractors		
Airgas Safety 128 Wharton Road Bristol, PA 19007	Nancy Davidson	Provided powered air-purifying respirators for on-site personnel.
Biomarine 456 Creamery Way Exton, PA 19341	Bill Flynn	Provided biopaks, face masks, cylinders, and gelatin tubes throughout the response.
Coastal Safety & Health 14 Pigeon Hill Drive, Suite 170 Sterling, VA 20165	Brian Clark	Provided on-site personnel with an indoor air quality meter.
Dupont Qualicon 3531 Silverside Road, Bedford Building Wilmington, DE 19810	Michael Parr	Provided technical advice regarding PPE, specifically the fully encapsulating suits.
DynCorp 6101 Stevenson Avenue Alexandria, VA 22304	Jim King	Maintained an inventory of all critical items removed from the buildings.
Envirofoam 2903 Wall Triana Highway, Suite 5B Huntsville, AL 35824	Jim Moran Peter Deucher	Provided 250 gallons of Sandia foam needed to conduct decontamination in the office suite. Provided expert advice during decontamination with foam.
Fire & Rescue Safeware Inc. 9475 Lottsford Road, Suite 150 Largo, MD 20774	Richard Bond	Supplied PPE to on-site personnel.
Lockheed Martin/REAC 2890 Woodbridge Avenue Edison, NJ 08837	Lawrence Kaelin John Wood	Assisted with spore strip preparation and placement design.
New Horizons Diagnostics 9110 Red Branch Road Columbia, MD 21045	Cheryl Trudil	Provided anthrax supplies (sampling kits) to on-site personnel.
Science Applications International Company (SAIC) 1410 Spring Hill Road, Suite 400 McLean, VA 22102	Dr. Paul Schaudies	Provided technical advice and support regarding spore strips and decontamination alternatives.
Silva Consulting Services (SCS) 2055 Conan Doyle Way Eldersburg, MD 21748	Dr. John Silva	Headed data management and chaired the clearance committee.
U.S. Art 66 Pacella Park Drive Randolph, MA 02368	Mark Lank	Provided technical advice regarding art removal and decontamination.

Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
Subcontractors		
Ashland 6400 Blazer Parkway Dublin, Ohio 430417	Sam Eltomi	Subcontractor to IT Corporation - Provided chemicals and expertise support during fumigation with ClO_2 gas.
GeoTrans Inc. 710 Avis Drive Ann Arbor, MI 48108	Michelle Gillie	Subcontractor to Tetra Tech EM Inc. - Provided sampling and decontamination support.
Maxim 618 South 25th Street Billings, Montana 59101 (406) 248-9161	Bill Herman	Subcontractor to Tetra Tech EM Inc. - Provided sampling and decontamination support.
Sabre Oxidation Technologies Inc. 2642 Marco Avenue Odessa, TX 79762	John Mason	Subcontractor to IT Corporation - Designed and provided the systems for fumigating the Daschle suite and heating, ventilation, and air-conditioning (HVAC) system.
SCM Consultants Inc. 7601 West Clearwater Avenue, Suite 301 Kennewick, WA 99336	Angie Coppenhaver	Subcontractor to Tetra Tech EM Inc. - Provided sampling and decontamination support.
Sterling Pulp Chemicals 3412 West Holcombe Boulevard Houston, TX	Albert O. Massey	Subcontractor to IT Corporation - Provided technical support during ClO_2 fumigation.
Tetra Tech, NUS Foster Plaza VII 661 Andersen Drive Pittsburgh, PA 15220 (412) 921-7090	Matt Soltis	Subcontractor to Tetra Tech EM Inc. - Provided sampling and decontamination support.
Laboratories		
Southwest Research Institute (SwRI) 6220 Culebra Road Post Office Drawer 28510 San Antonio, TX 78228	Marian Keller Jo Ann Boyd	Analyzed spore strips in the lab and provided results to EPA.
Dugway Proving Grounds West Desert Test Center, Building 2029 Dugway, UT 84022	John D. Wright, Ph.D	Analyzed spore strips in the lab and provided results to EPA.
U.S. Naval Medical Research Center (NMRC) Biological Defense Directorate 503 Robert Grant Avenue, Suite 1A24 Silver Spring, MD 20910	Dr. Joan Gebhardt	Analyzed spore strips in the lab and provided results to EPA.

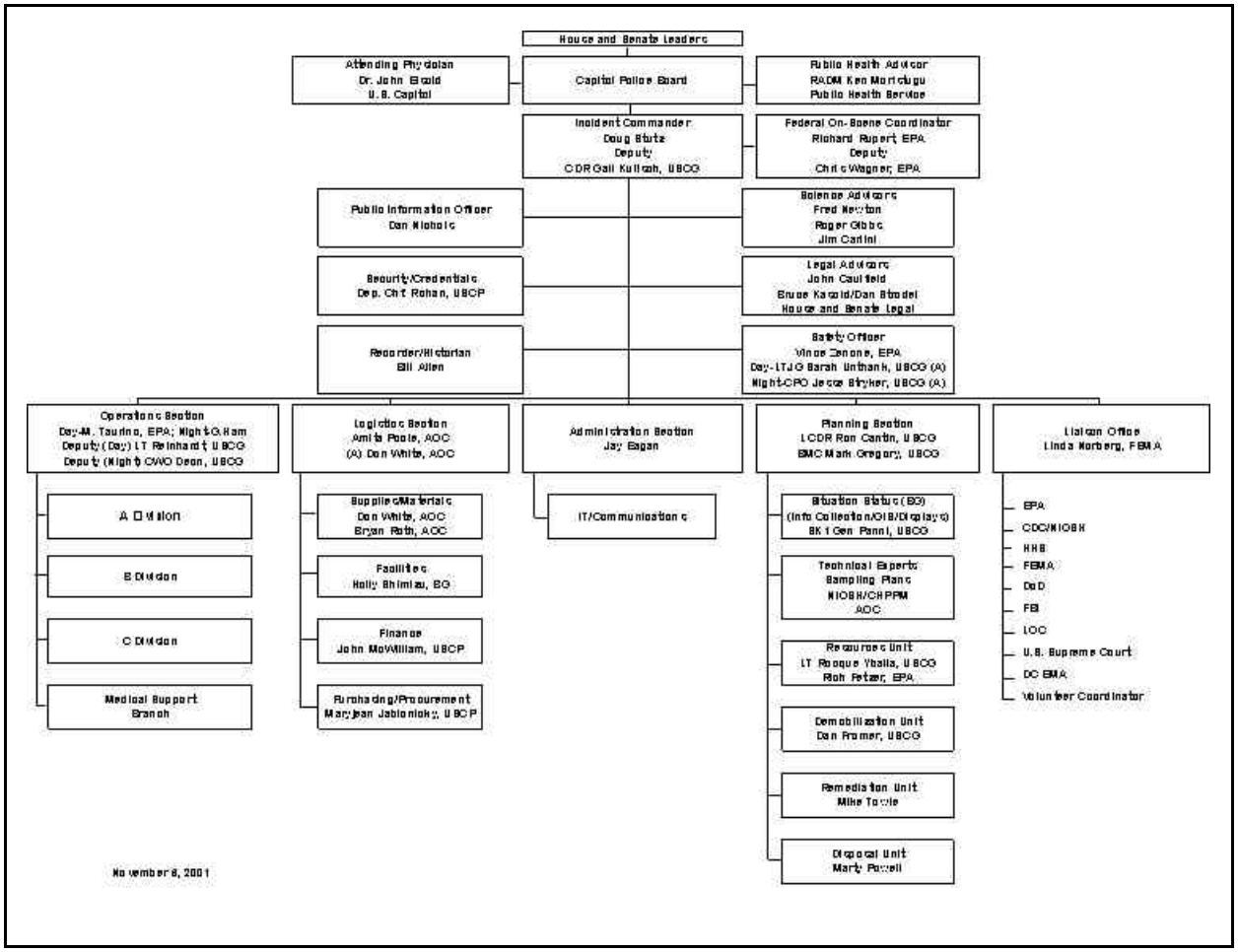
Table 2.2: Roster of Agencies, Organizations, and Individuals

Organization	Contact	Duties
University of California, Berkeley Department of Molecular and Cell Biology 401 Barker Hall, Number 3202 Berkeley, CA 94720	Dr. Terrance Leighton	Analyzed spore strips in the lab and provided results to EPA.
U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) 1425 Porter Street, Building 1425, Room 100 Fort Detrick, MD 20910	COL Erik A. Henchal	Analyzed spore strips in the lab and provided results to EPA.

2.3 Organization of the Response

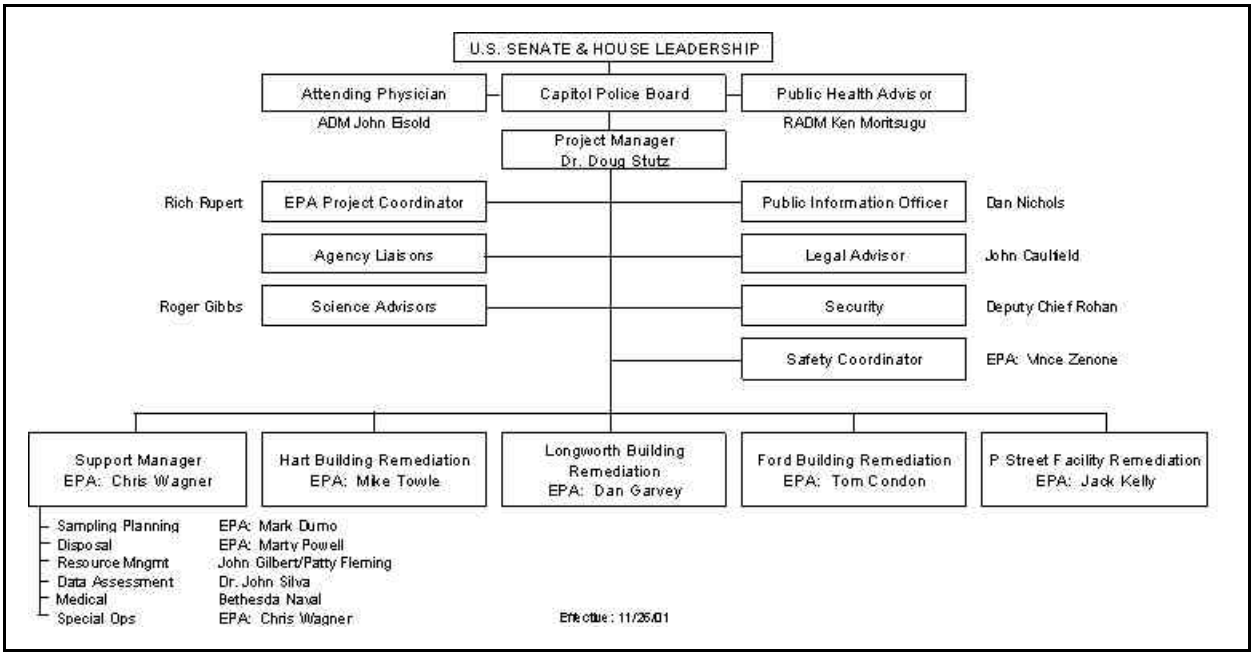
From October 20 to November 13, the response was managed according to an ICS. This stage of the response was considered to be the emergency phase. Figure 2.1 is a diagram of the command structure that represents the general organization of the response as it was on November 6.

Figure 2.1: General Management Structure During the Emergency Phase



On November 13, the response moved from the emergency phase to a remedial phase (Note: For the Capitol Hill Site, the terms "remedial" and "remediation" generally refer to all activities related to decontamination). A Remedial Phase Organization emerged as the management structure. The Remedial Phase Organization, as it was on November 26, is presented in Figure 2.2 (Note: Figure 2.1 and 2.2 are presented as shown on source documents).

Figure 2.2: Remedial Phase Organization



3.0 NARRATIVE OF EVENTS

The Capitol Hill Site response began with initial sampling activities at 26 building locations to identify buildings that contained anthrax. Anthrax was detected in seven buildings, all of which required further response actions. In general, the responses in each of the seven buildings included further initial sampling to identify all rooms and building areas (Such as foyers, hallways, and elevators) that contained anthrax; characterization sampling to define the extent of contamination in each room and building area; decontamination, using a variety of techniques; verification sampling to determine the need for further decontamination; and final reviews and decisions to clear each building for reoccupation. The timing, nature, and extent of these activities were tailored for each building, based on the extent of the anthrax contamination. In addition, some buildings required removal of critical items that could have been damaged by specific decontamination activities.

Section 3.1 describes the initial sampling activities to identify the seven building that required response actions, and Sections 3.2 through 3.8 specifically describe the activities that were conducted in each of seven buildings where anthrax was detected.

3.1 Initial Sampling Activities

After the opening of an anthrax-contaminated letter delivered to Senator Daschle's office on October 15, 2001, EPA and other agencies immediately began investigations at locations throughout the Capitol Hill area. Initial sampling began under the National Institute for Occupational Safety and Health (NIOSH), which was assisted by the Center for Health Promotion and Preventive Medicine (CHPPM), National Strike Force (NSF) and the Chemical and Biological Incident Response Force (CBIRF). NSF entry teams assisted with sampling in initial phases of tactical operations including taking samples. Sampling was initially conducted along the "mail trail" by following the delivery route of mail to congressional buildings. The delivery route was traced back to the Brentwood Post Office through the Dirksen Building and P

Street Warehouse mail facilities. The air handling unit (AHU) and heating, ventilation, and air-conditioning (HVAC) system was sampled in the Daschle stack (vertical zone) of the Hart Building. The first round of sampling encompassed 26 buildings, with 20 to 130 initial samples collected in each building.

Results from the initial assessment indicated that 19 buildings were not contaminated with anthrax, therefore, no further action was necessary. However, seven buildings were contaminated with anthrax and required characterization sampling, decontamination, and verification sampling (Section 1.1). The following section summarizes the major events that occurred in each of the seven contaminated buildings. The summaries are represented in seven time lines, one for each building (Figures 3.1 through 3.7).

3.2 Hart Building

On October 15, CPBS responded to a call regarding a suspicious letter received at the Hart Building. EPA was notified on October 16, and OSC Rupert mobilized to the scene. On October 17, the Hart Building closed and EPA Region 3 mobilized three additional OSCs and assessment teams to the Capitol Hill area. On that same day, NIOSH personnel conducted sampling at several locations throughout the Capitol Hill area, beginning with floor-by-floor assessments. A core group from the Office of the Architect of the Capitol (AOC) provided reconnaissance and logistical support to the EPA teams, which were collecting the initial building samples. USCG's National Strike Force was activated by OSC Rupert to conduct entries.

During the response, 4,854 samples were collected throughout the Hart Building. The sampling events occurred in three sequential stages at various times and places in the building: initial, characterization, and verification sampling. Initial sampling was the first stage in the sampling process for a given location. Initial sampling at the Hart Building occurred on a room-by-room basis from October 17 through December 16. Characterization sampling also occurred on a

room-by-room basis, but only in rooms where anthrax was detected during the initial sampling phase. Characterization sampling occurred at different times from November 5 through January 17. During characterization, contractor personnel performed critical item removal (Section 4.3.1). Verification sampling occurred following decontamination in the time period of October 30 through January 19.

Results from initial sampling indicated anthrax contamination in the following suites: 207, 209, 410, 416, 445, 610, 614, 615, 616, 619, 627B, 631, 636, 810, 812, 814, and 818B. During the response, these suites were characterized, decontaminated topically with chlorine dioxide (ClO_2) liquid and Sandia foam, and sampled to verify that the anthrax spores were killed or removed. Suite 612 was decontaminated with topical applications of ClO_2 solution and fumigation using ClO_2 gas.

On October 20, EPA expanded the NSF role to include incident management. On October 23, EPA mobilized additional OSCs and sampling crews to the site. On October 27, EPA developed preliminary decontamination plans, at which time fumigation with ClO_2 gas emerged as the best option (Sections 4.2.1 and 4.3.3). On October 31, EPA submitted a draft of the "Proposed Action Plan for Remediation of the Hart Senate Office Building" for peer review, indicating that the entire Hart Building would be decontaminated with ClO_2 gas.

Building reconnaissance, which consisted of taking photographs and validating plans of the building, began on October 16 and continued through January 2. The objectives of reconnaissance were to (1) establish familiarity with the building layout, (2) observe plenum construction and accessibility to plenum sampling points within Senate suites, (3) observe mail handling locations in several suites, and (4) obtain video to use for training sampling teams.

On November 9, EPA selected a vendor for application of ClO_2 liquid and to supply the equipment and materials needed to perform ClO_2 decontamination. On November 10, OSC Mark Durno, Tony Intrepido (CHPPM), and Christopher Weden (EPA), began conducting pre-

decontamination air sampling to test for re-aerosolization, which continued through November 13. The analyzed results of air sampling indicated that spores became readily airborne when the surrounding area was disturbed.

Decontamination, using high efficiency particulate arresting (HEPA) vacuums, Sandia foam, and ClO_2 liquid took place from early November through January 17. Foam decontamination took place from November 4 through November 8. Cleaning up the foam was problematic, and in addition, the effectiveness of the Sandia foam was uncertain. Therefore, it was determined that ClO_2 liquid would be used rather than foam to decontaminate the surfaces in the building.

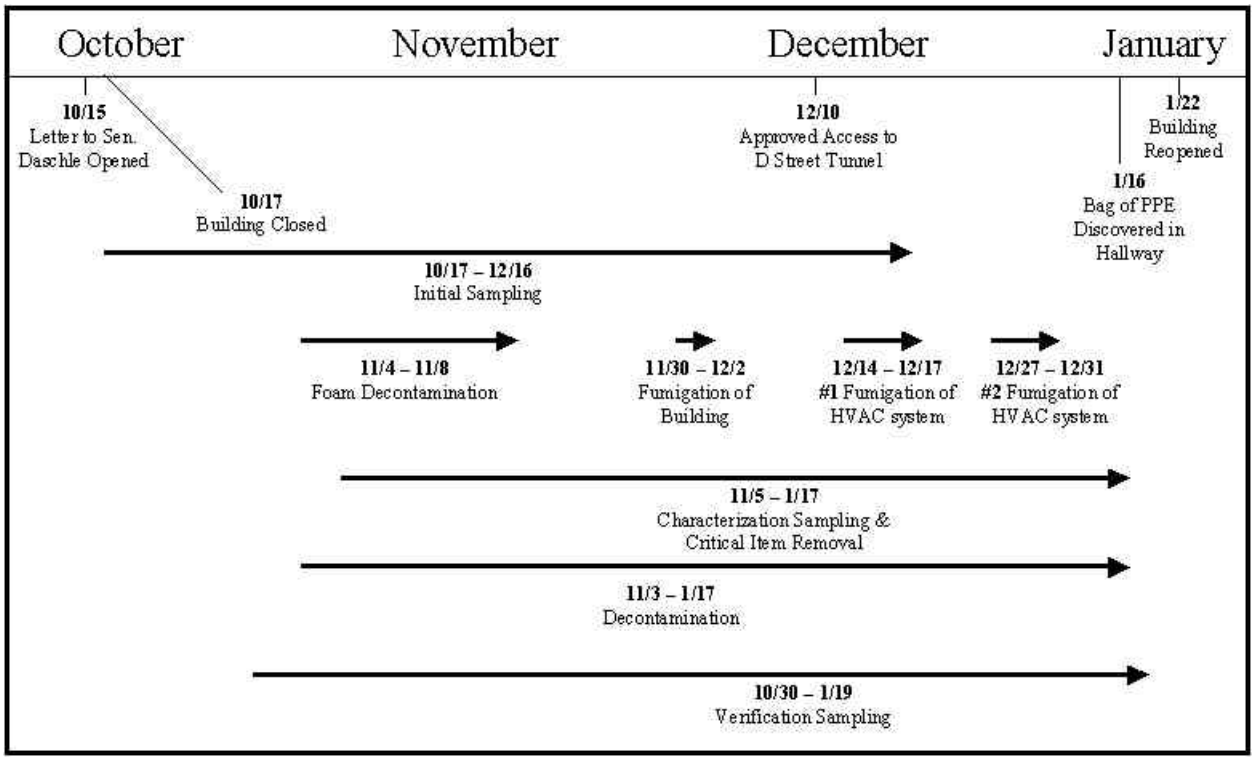
On November 16, EPA issued an emergency exemption authorizing the transportation in commerce of solid materials contaminated with anthrax. Also in November, EPA issued crisis exemptions for the limited sale, distribution, and use of Sandia foam and ClO_2 liquid.

The first fumigation was applied in the Daschle suite on November 30 through December 2. The second fumigation was applied to the HVAC system for the Daschle suite from December 14 through December 17, and the third fumigation was applied to that same HVAC system from December 27 through December 31.

On December 7, the Office of Solid Waste and Emergency Response (OSWER) issued a crisis exemption for the limited sale, distribution, and use of EPA-registered pesticide product Ethylene Oxide (EtO). At this time, critical items from the Hart Building were transported to a facility in Richmond, Virginia, where they were fumigated using EtO gas.

On January 10, START personnel sampled and restarted the HVAC system. On January 15, EPA submitted the "Hart Senate Office Building Release Recommendations" for approval, and on January 16, START and ERRS personnel loaded the last batch of waste on the transporter for off-site disposal at Fort Detrick in Frederick, Maryland. On January 16, START personnel identified a bag of PPE in the ceiling above suite 612; the area was isolated, decontaminated, and sampled. The Hart Building reopened on January 22.

Figure 3.1: Time Line of Major Events in the Hart Building (October 2001 to January 2002)



3.3 Longworth Building

On October 17, the Longworth Building closed. Approximately 1,450 samples (including initial, characterization, and verification samples) were collected during the course of addressing and decontaminating the Longworth Building. Samples were first collected in the Longworth Building as part of an initial assessment, which occurred from October 23 through October 31. The initial sampling of the Longworth Building occurred prior to many other buildings because of the discovery of anthrax on the strapping machine in the Ford Building mail room, which services both buildings. Following the path of the mail delivery, all mail stops in the Longworth Building were sampled during the initial assessment. The results of the initial assessment found three general areas in and around suites 1605, 1630, and 1740/1741 as positive for anthrax.

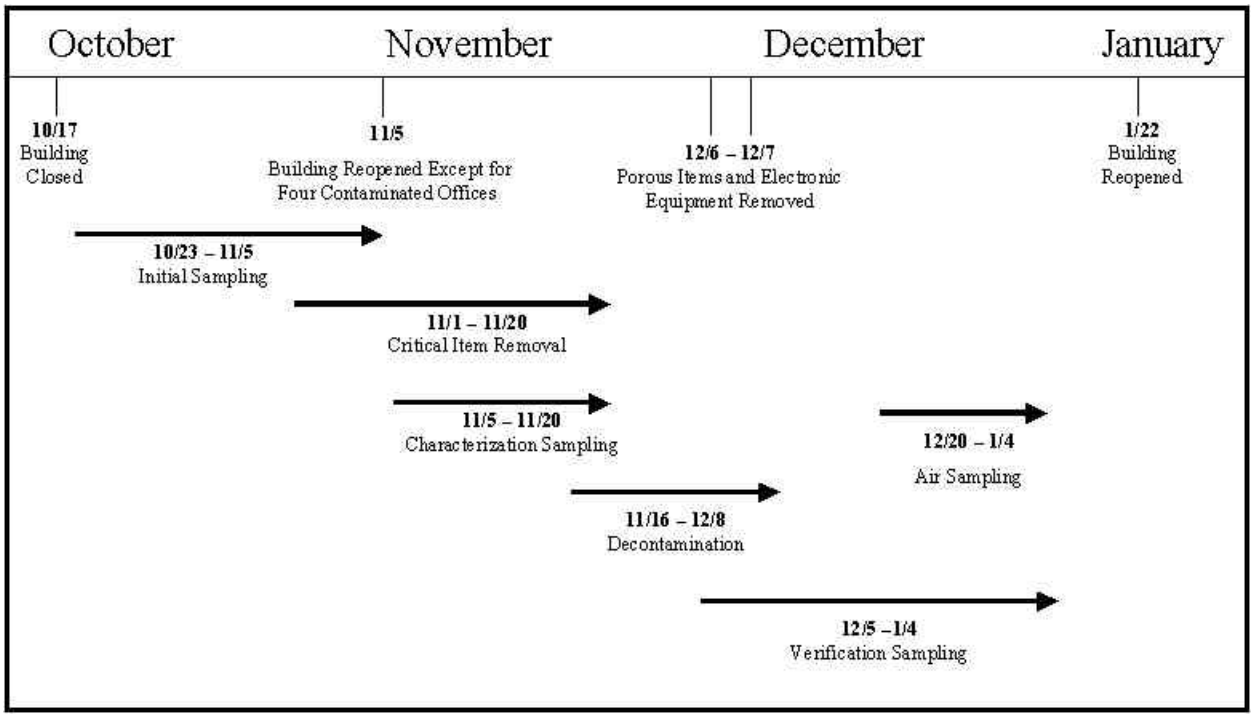
Sampling was also conducted to determine if anthrax spore contamination was present in the HVAC system associated with the three identified suites and the hallways adjoining them. These areas were sampled and all sample results were negative for anthrax. On November 3, the contaminated suites were isolated and negative air machines were placed inside. On November 5, sampling results indicated that Suite 1632 was also contaminated.

Characterization sampling occurred from November 5 through November 20. During this time, critical items (Section 4.3.1) were removed and sampled. All critical sample results were negative for anthrax.

Decontamination using HEPA vacuums and ClO_2 liquid occurred between November 16 and November 20 in suites 1605, 1630, 1632, and 1740/1741. Final decontamination, using ClO_2 liquid, occurred on two separate occasions. The first decontamination event occurred on November 25 in suites 1740/1741, and the remaining contaminated suites were decontaminated on November 26. The second application of ClO_2 liquid occurred on December 8 following the removal of the plastic sheeting from the decontamination zone.

Verification sampling occurred at different times with separate media types: HEPA, wipes, and air sampling. Verification wipe samples were collected on December 5 following an application of ClO_2 liquid. Verification air sampling occurred on December 20 and December 21 in the contaminated suites. Between December 6 and 7, all porous items and large electronic equipment were removed following treatment and transported off-site for disposal or further treatment. On January 3, suites 1630 and 1632 were re-isolated. Air sampling occurred in suites 1630 and 1632 on January 3 and January 4, respectively. On January 22, the Longworth Building was reopened.

Figure 3.2: Time Line of Major Events in the Longworth Building (October 2001 to January 2002)



3.4 Ford Building

The work that occurred in the mail room of the Ford Building resulted from the accidental spread of anthrax contamination. The CPBS inadvertently contaminated gear bags, equipment, and a cardboard box by placing these items in the hallway outside a contaminated suite in the Hart Building. These items were placed on the floor in the Hart Building, transported in the CPBS vehicles and returned to the CPBS office in the Ford Building.

During the effort to backtrack the route of the Daschle letter prior to its discovery in the Hart Building, sampling teams determined that mail first went from the Brentwood to the P Street Warehouse. From the P Street Warehouse, the mail for the House of Representatives was sent to the mail room located in the basement of the Ford Building, prior to distribution to the other House office buildings.

During the course of assessing and decontaminating the Ford Building, 782 samples were collected. The initial assessment occurred from October 18 through October 31. During the initial assessment, 170 samples were collected in the mail room and CPBS office. Eight samples collected in four rooms tested positive for anthrax.

Characterization sampling took place from October 31 through December 1. During characterization, 115 samples were collected throughout the building. All 115 samples tested negative for anthrax.

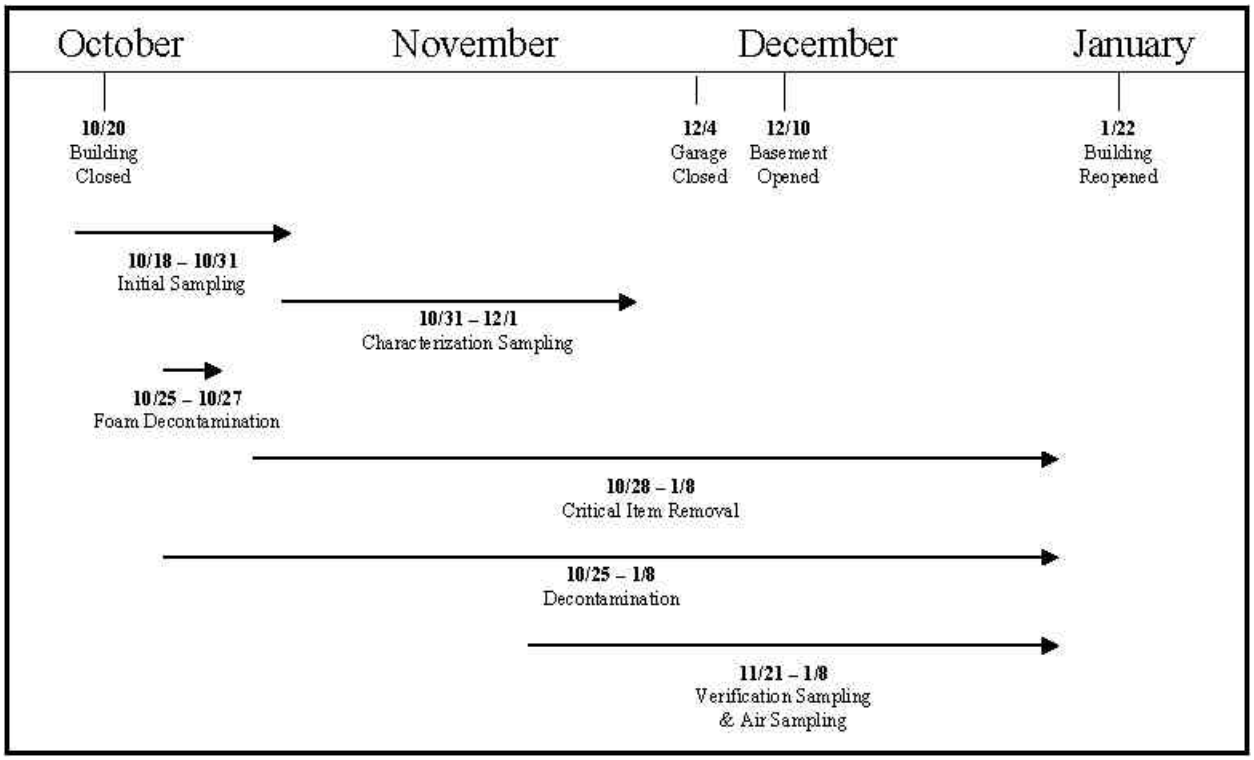
The next phase was decontamination of the four rooms where samples tested positive for anthrax spores. The first attempt to decontaminate one of the contaminated rooms (the mail room) occurred from October 25 through October 27, using Sandia foam. Later, it was determined that ClO_2 liquid would be used rather than foam to decontaminate the surfaces in the building. The decontamination effort included isolation of the contaminated areas, decontamination using HEPA vacuums, and the removal of any remaining critical and other personal items for off-site treatment (occurred from October 28 through January 8). On December 2, ClO_2 liquid was applied to all surfaces remaining in the rooms. As a final step in the decontamination, all porous items including carpet, draperies, cloth items, chairs, and sofas, were removed from the rooms for off-site disposal.

Surficial verification sampling was performed after decontamination with Sandia foam or ClO_2 liquid from November 21 through December 15, and focused on those personal and office items that had tested positive for anthrax contamination. With two exceptions, verification sampling in the rooms detected no further anthrax contamination. The two exceptions were samples collected from lockers located in room 180B, which contained gear bags and equipment that the CPBS had used at the Hart Building. The contaminated items were bagged, tagged and sent for off-site EtO treatment.

The second round of decontamination occurred on December 9 to address the positive verification samples. ClO_2 liquid was applied to all surfaces (walls, desk drawers, primary walkways), the lockers, and other locations. Additional verification samples were then collected.

Air verification sampling was conducted on January 4, to complement surface verification sampling and as a final step in polishing the air. The goal of the air sampling was to closely simulate conditions that would be found in the office environment once the rooms were re-occupied. The air sampling activities included high-volume dry filter unit (DFU) samples and five low-volume gelatin samples. One of the low-volume gelatin samples returned a positive result, indicating that anthrax was re-aerosolized, indicating anthrax was still present in trace amounts. Therefore, a third round of decontamination occurred in the building on January 7, consisting of the application of ClO_2 liquid to all exterior and interior surfaces. Additional low-volume gelatin filter samples were collected to determine the effectiveness of the decontamination, and all returned a negative result for anthrax. The Ford Building was cleaned and reopened for business on January 22.

Figure 3.3: Time Line of Major Events in the Ford Building (October 2001 to January 2002)



3.5 Dirksen Building

From October 18 through October 28, START and ERRS entry teams conducted initial sampling in the Dirksen Building. The sampling team collected 130 samples as part of the initial assessment.

On October 20, the Dirksen Building was closed after six samples tested positive for anthrax. On the same day, START and ERRS personnel established a new entry and decontamination area at the entrance to the Dirksen tunnel. On October 21, START and ERRS personnel began preparing protocols for decontaminating the Dirksen mail room. On October 23, entry teams began to remove the mail and conduct characterization sampling.

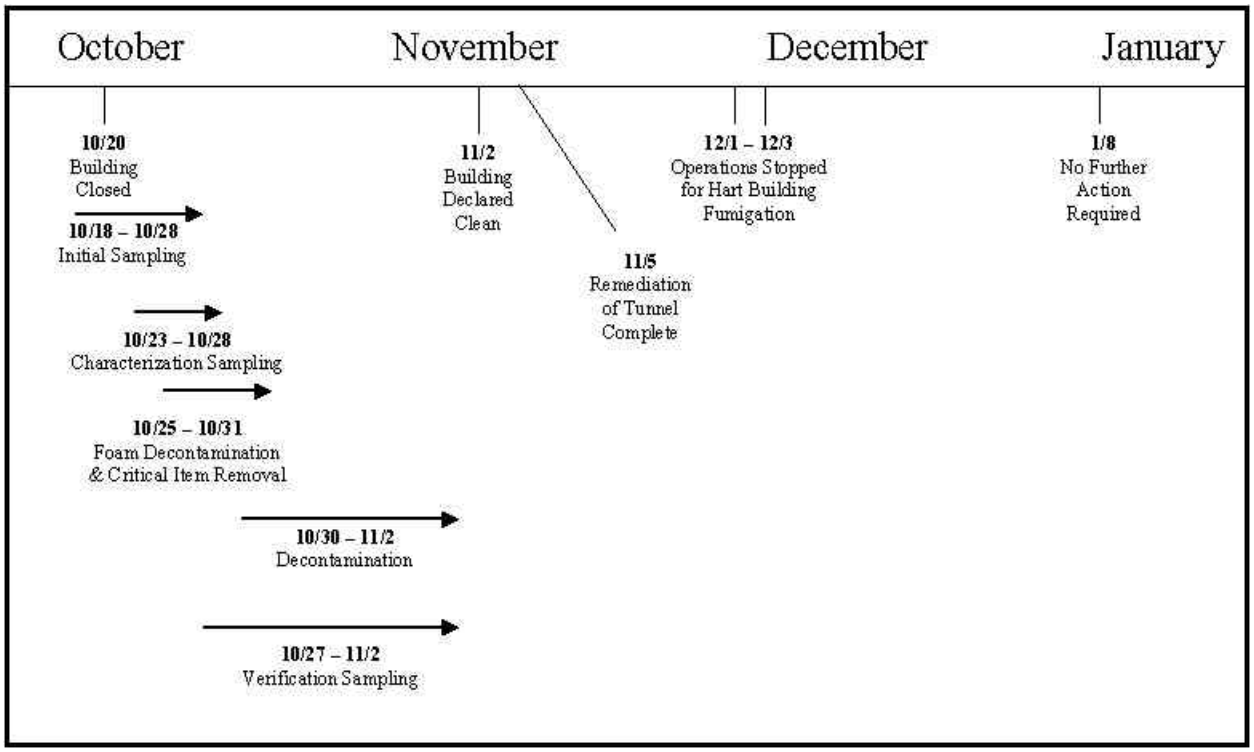
From October 25 through October 29, ERRS personnel decontaminated the mail room using HEPA vacuums and Sandia foam. During that time, entry teams also bagged and tagged the mail in preparation for transporting it off-site for decontamination and set up personnel decontamination lines.

From October 28 through October 31, entry teams performed air monitoring. Verification sampling occurred October 27 through November 2.

On October 30 and 31, teams decontaminated the Dirksen tunnel area and vehicles with a 10 percent solution of bleach. The vehicles were decontaminated because contaminated gear was transported in them. On November 1, teams began using ClO_2 liquid to decontaminate mail carts and cubby boxes. Decontamination with ClO_2 liquid continued throughout the building and mail room through November 2.

A second round of verification sampling occurred following decontamination with ClO_2 liquid on November 2. The Dirksen Building was declared clean and opened for business on November 2. The tunnel remained sealed for further decontamination, along with certain other areas of the building. Decontamination of the tunnel was complete on November 5.

Figure 3.4: Time Line of Major Events in the Dirksen Building (October 2001 to January 2002)



3.6 P Street Warehouse

Initial sampling began at the P Street Warehouse on October 18 and continued through November 4. During this time, START and ERRS personnel collected a total of 42 initial samples. From October 29 through October 31, CBIRF personnel extracted the mail and personal packages from the mail room, placed them in overpack drums, and placed the drums in conex boxes. The conex boxes were later turned over to the FBI. On November 2, FBI completed packaging the stored mail to be used as evidence and removed overpack drums from the facility.

The results of initial sampling identified three areas that tested positive for anthrax, including the Senate Furniture Area, House Mail Storage Area, and four X-ray machines in the Senate Mail Loading Dock Area. The results prompted further characterization sampling, which occurred

from November 15 through January 12. During this time, mail and other critical items were removed. START and ERRS personnel collected a total of 360 characterization samples.

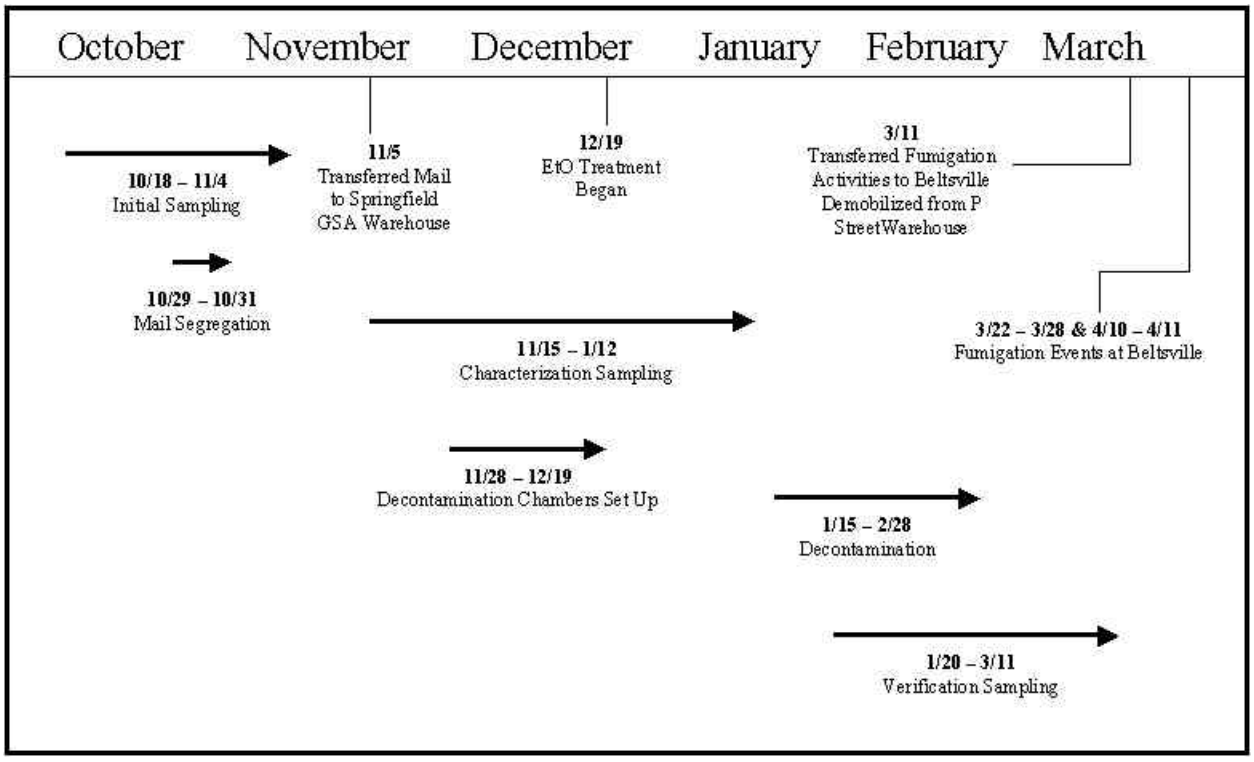
In early November, FBI identified the General Services Administration (GSA) Warehouse in Springfield, Virginia as a secure location to sort through mail that was sent to the P Street Warehouse. This sorting was conducted to search for a second letter contaminated with anthrax. On November 15, EPA CID and the FBI transported several drums of mail from the P Street Warehouse to the Springfield GSA Warehouse and constructed containment areas inside the GSA Warehouse. On November 16, EPA CID identified a letter addressed to Senator Leahy that contained anthrax spores; this letter was found in a barrel of unopened congressional mail that was transported from the P Street Warehouse. The FBI and EPA sorted mail, decontaminated the containment areas, and conducted verification sampling at the GSA Warehouse through December 20.

A Mail Segregation/Categorization Plan for the P Street Warehouse was developed by the Planning Section of the ICS. On November 20, the plan was given final approval by the Incident Commander. Decontamination chambers were established between November 28 and December 19. The chambers were designed to treat critical items. An isolation zone was constructed in the House Mail Storage Area from December 10 through December 15, and from December 8 through December 15 in the Senate Mail Loading Dock Area.

Decontamination activities occurred in the House Mail Storage Area on February 8, and again on February 13 through 17, using HEPA vacuums and ClO_2 liquid. At the Senate Mail Loading Dock Area, decontamination occurred on January 15, January 26, January 31 through February 2, and again from February 26 through February 28. Entry teams used HEPA vacuums to decontaminate the hots spots in the Senate Furniture Area on February 12. Verification sampling took place following each decontamination event, from January 20 through March 11; 865 verification samples were collected. After March 11, all decontamination activities were complete at the P Street Warehouse and the support teams were demobilized.

On December 19, EPA began to ship the mail from the P Street Warehouse to the Richmond facility for decontamination with EtO; continued through January 4. On January 4, a shipment of mail was sent to the Brentwood Post Office; this shipment was then forwarded to a facility in Lima, Ohio for irradiation. On March 11, 506 additional bags of potentially contaminated House and Senate U.S. mail and private carrier packages from the P Street Warehouse facility were transferred to the United States Department of Agriculture (USDA) Research Center located in Beltsville, Maryland for fumigation with ClO_2 gas. In addition, various electronic items from P Street Warehouse and critical items that were not successfully treated during EtO sterilization were also treated at the Beltsville facility. The fumigation events took place from March 22 through March 28 and again on April 10 and 11.

Figure 3.5: Time Line of Major Events in the P Street Warehouse (October 2001 to March 2002)

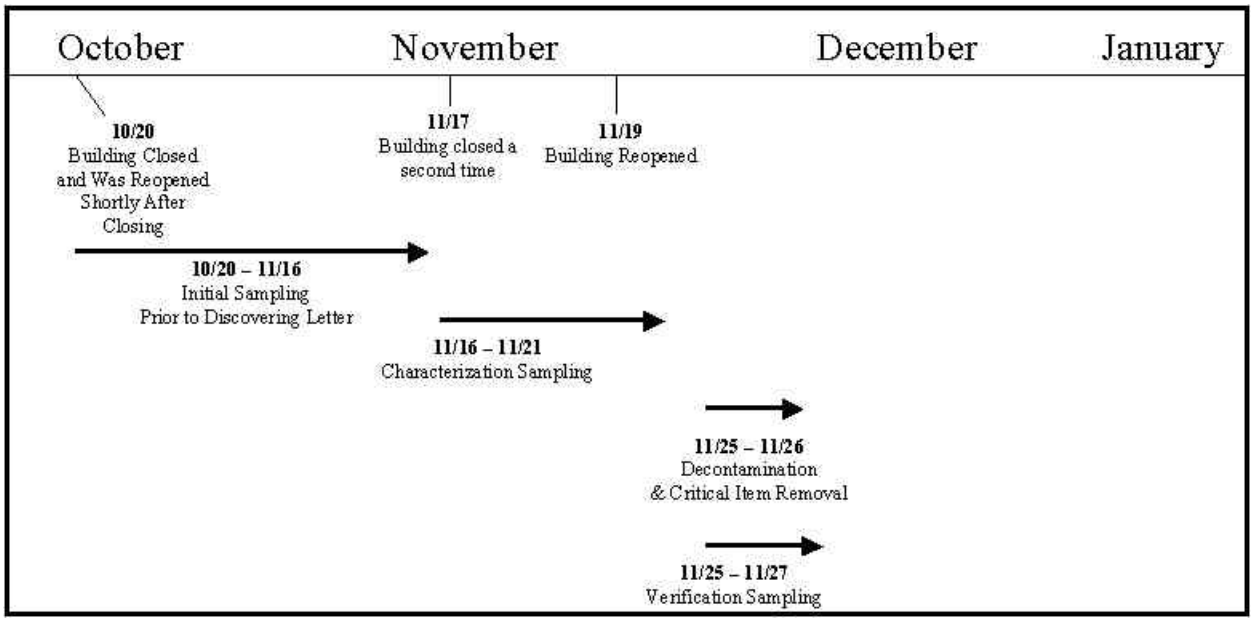


3.7 Russell Building

The Russell Building was closed on October 20, after the discovery of the Daschle letter. START and ERRS personnel collected a total of 273 samples, including 38 initial samples, 228 characterization samples, and 7 verification samples. Initial sampling occurred from October 20 through November 16. Characterization sampling began on November 17 and continued through November 21 in response to the discovery of a second anthrax-tainted letter addressed to Senator Leahy.

On November 19, the Russell Building was reopened, but sampling and decontamination activities continued at night through November 27. Characterization sampling results were positive for the mail handling areas of two suites in the Russell Building, suites SR322 and SR446. On November 24, personnel removed mailboxes from suites 446 and 322A, and also removed and drummed mail from suite 322A. Application of ClO_2 liquid occurred from November 24 through November 26. Verification sampling occurred following decontamination from November 25 through November 26. All sampling and decontamination activities were complete on November 27.

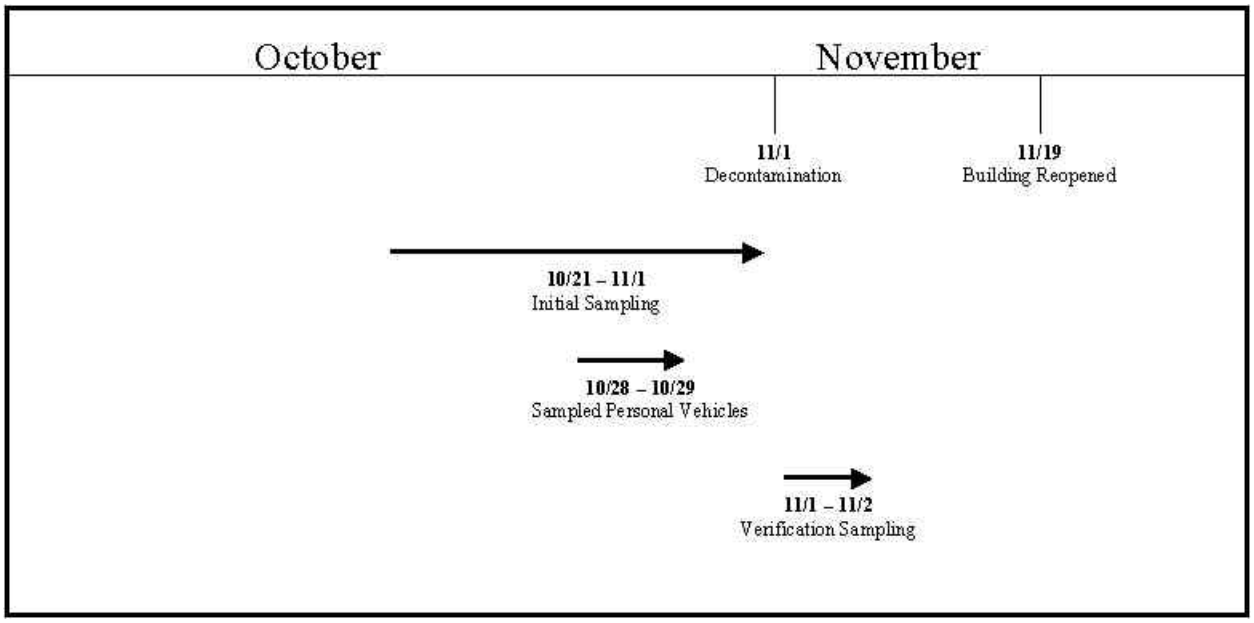
Figure 3.6: Time Line of Major Events in the Russell Building (October 2001 to January 2002)



3.8 Supreme Court Building

Initial sampling occurred at the Supreme Court Building from October 21 through November 1. Decontamination with HEPA vacuums and ClO_2 liquid occurred on November 1. Verification sampling occurred following decontamination from November 1 through November 2. All verification samples were negative and the building was reopened on November 19. A total of 318 samples were collected during the response in the Supreme Court Building.

Figure 3.7: Time Line of Major Events in the Supreme Court Building (October 2001 to November 2001)



4.0 EFFECTIVENESS OF THE REMOVAL

This section describes and analyzes six major activities that were performed as part of the Capitol Hill Site response. Sections 4.1 through 4.7 address incident command, joint clearances, sampling, decontamination, community relations, disposal, and health and safety, respectively.

4.1 Incident Command System

This section describes and analyzes the command structures (or management organizations) that were adopted as part of the ICS that was used to direct the Capitol Hill Site response. For this response, two distinct phases of management organization evolved: emergency management and remediation management. The first month of the response, the emergency phase, was managed in accordance with a rigid reporting structure that was designed to control the level of communication among responders, and thereby protect leakage of proprietary information related to the ongoing criminal investigation. After the first month, the emergency phase of the response evolved into the remediation phase. At that point in time, the activities were managed under a Remedial Phase Organization that addressed activities for each contaminated building separately. The following subsections describe the ICS and the management phases of the Capitol Hill Site response, including the sequence of events, their development, the difficulties encountered in their application, and the lessons learned and recommendations pertaining to their future application.

Sequence of Events

The anthrax contaminated letter addressed to Senator Daschle was opened in the Daschle suite on October 15, 2001. Staffers called the U.S. Capitol Police, who are responsible for responding to any incident that occurs in the Capitol. Deputy Chief Rohan of the Capitol Police was in charge of the scene. The National Response Team (NRT) was activated to provide support and guidance to agencies responding to the various anthrax incidents around the country, including

the Capitol Hill Site. EPA responded on October 16, with OSC Richard Rupert arriving on-site. Within 1 to 2 days, the Capitol Police realized the scope of the problem was beyond their area of expertise. Representatives from NIOSH arrived on-site to perform initial sampling. Personnel from the USCG's NSF were activated by OSC Rupert in accordance with the National Contingency Plan and arrived on-scene. The USCG, FEMA, and EPA recommended the implementation of the National Interagency Incident Management System (NIIMS) ICS to manage the response. On October 20, a formal structure of the ICS emerged, and the House of Representatives contracted Dr. Douglas Stutz, a private consultant with anthrax experience, to serve as the Incident Commander. An Incident Command Center was established on D Street across from Capitol Police Headquarters. Figure 2.1 presents a diagram of the initial ICS that was developed as of November 6. Through the course of the emergency phase the ICS was modified as staffing and circumstances required.

On November 13, the Capitol Hill Site response transitioned from an emergency phase to a remedial phase, and the Remedial Phase Organization was introduced to the response team. The Remedial Phase Organization, as of November 20, is presented in Figure 2.2. This transition was motivated by the reduction in scope of the initial response. By mid-November, site characterization narrowed the initially extensive focus as the mail trail was characterized and contamination was pinpointed to four buildings: the Hart Building, the Ford Building, the Longworth Building, and the P Street Warehouse (sampling and decontamination activities at the Dirksen, Russell, and Supreme Court Buildings were complete before the organization of the response transitioned to the Remedial Phase Organization). The Remedial Phase Organization restructured work and resources more efficiently and effectively to restore the affected buildings to full operation. It compressed operations and planning functions into a single functional element focused on building locations (versus activity) and eliminated redundant organizational layers.

Once the transition was made to the Remedial Phase Organization, the remaining four buildings requiring decontamination were managed by the Incident Commander, Dr. Stutz. OSC Rupert

was designated the EPA Project Coordinator and facilitated EPA policy and programming issues, including scope of work to be performed by EPA. OSCs coordinated their activities with applicable support elements, such as the Capitol Hill Police and AOC, and the respective Congressional representatives through the EPA Project Coordinator. All projects requiring written plans and time line projections had to be approved by the EPA Project Coordinator. The emergency phase use of an overall Incident Action Plan (IAP) was replaced in the remediation phase by the use of building-specific plans and implementation time lines. Work and task management was under the direction of individual OSCs responsible for each building. Work at each of the four buildings was closed out independently.

Table 4.1 identifies the key parties involved in both the emergency and remedial phases and their functions.

Difficulties Encountered

Difficulties that were encountered with the management organization during both phases of the response included:

- Daily changes of various objectives throughout the response.
- Lack of familiarity with the use of an ICS on the part of some response participants.
- Complicated communication and hindrance of implementation of numerous activities due to the complex command structure.
- Challenges to EPA posed by the presence of multiple decision-makers involved in the response.

Successes

Although far from ideal, the incident management organizations contributed significantly to the successful decontamination of the Capitol Buildings. Also, allowing the organizational structure of the response team to evolve over time improved the efficiency of the response as it progressed. The EPA OSCs and USCG personnel cooperated and were able to integrate their respective

skills, despite the differences in structure and function of their respective management systems. The presence of key personnel for the entire duration of the response was particularly helpful as it provided a level of continuity that enabled a more efficient response.

Table 4.1: Key Parties Involved in the Response

Party Involved	Function	Key Personnel
House and Senate Leaders	Use the offices inside the contaminated buildings	Several House Representatives and Senators
Capitol Police Board	Maintain the security of the Capitol Buildings and has jurisdiction over the property	Senate Sergeant at Arms MAJ GEN Alfonso E. Lenhardt, U.S. Army (Ret.)
Incident Commander	Manage the response	Dr. Douglas Stutz
U.S. Environmental Protection Agency	Manage the environmental decontamination aspects of the response; EPA provides and funds the Environmental Response Team (ERT), which is dispatched at the OSC's request to any response episode exceeding available regional resources. The ERT can provide support for site assessments, health and safety issues, action plan development, and contamination monitoring	Mr. Rich Rupert, On-Scene Coordinator and EPA Project Coordinator
U.S. Coast Guard National Strike Force	Deputy to the Incident Commander; assist in coordinating and managing the response. The National Strike Force is a designated Special Team under the National Contingency Plan and supports both EPA and USCG OSC's with tactical entry teams, specialized equipment and incident management support.	CDR Gail Kulisch, Deputy to the Incident Commander

Lessons Learned and Recommendations

The uppermost tiers of the structure of the ICS did not function properly. The structure existed on paper, but the response actually functioned differently, sometimes even independently of the structure. To be effective, an Incident Commander should have legal jurisdiction over the site and must be able to commit resources and define missions according to an authorized IAP. In this response, the Incident Commander did not possess that authority. As a result, resources were committed and assigned somewhat randomly. Also, it was difficult to plan for further resources when requirements and objectives changed daily. It is strongly recommended that for a similar response, an empowered unified command structure be implemented. Had such an empowered, unified command structure been implemented in this response, many of the difficulties encountered in all areas of the response may have been lessened or eliminated. After the remedial phase of the response began, the Remedial Phase Organization functioned more efficiently. However, since the upper tiers of the Remedial Phase Organization were the same as those of the ICS, problems germane to those tiers persisted.

When key personnel were on-site throughout the duration of the project, a more efficient response ensued. In the future, steps should be taken early in the response to ensure to the greatest extent possible that key personnel selected to respond are able to commit to being on-site for the duration of the response.

4.2 Joint Clearances

As buildings were decontaminated, it became necessary to determine whether they could be re-occupied. Procedures for making these determinations were developed into a joint clearance process. The following subsections present a description of the joint clearance process, including its development, the difficulties and successes encountered during its application, and the lessons learned and recommendations pertaining to its future application.

Sequence of Events

During the last week of October and the first week of November, the response team decontaminated the Supreme Court mail handling room and the Dirksen Building. In lieu of the joint clearance process that would develop later, these buildings were informally cleared for reoccupation using a sign-off sheet. The sign-off sheet was circulated among the Incident Commander (Dr. Stutz), a contractor who was responsible for data management (Dr. Silva), and the attending physician (RADM John Eisold [MD]). As portions of the P Street Warehouse were decontaminated, they were also cleared using this sign-off process. In the third week of November, the response team decontaminated the Russell Building, which was the last building to be cleared using the sign-off process. Table 4.2 presents the buildings and clearance dates associated with the initial sign-off process for building clearance.

Table 4.2: Buildings and Clearance Dates Associated with the Initial Sign-Off Process for Building Clearance

BUILDING	DATE BUILDING WAS CLEARED
Dirksen Building	November 1, 2001
Supreme Court Building (Mail Handling Room)	November 2, 2001
Russell Building (Kennedy and Dodd Suites)	November 19, 2001
P Street Warehouse	Cleared section by section from November 2001 to March 2002

* CPBS vehicles were also cleared using this process on December 4, 2001.

At this time, the attending physician recognized that a more defined clearance process involving additional parties would be required to address the larger efforts that were underway in the Hart, Ford and Longworth Buildings. Several of the participants in the sign-off process also were critical of its informal nature, which required them to gather information independently to support their decisions. This type of information gathering generally consisted of discussions with the leaders of various activities within a given building. EPA OSCs repeatedly had suggested the establishment of a board or committee to implement the clearance process. EPA OSCs were concerned that the initial clearance process had no legal authority, and that there were

no clear analytical criteria established to define acceptable cleanup levels for anthrax. The AOC also was not satisfied with the previous method of clearing buildings and wanted a more formal method.

On December 4, representatives from the Centers for Disease Control (CDC) came to Washington, DC to meet with the EPA regarding the clearing of buildings for reoccupation. The goal of the meeting was to establish formal cleanup criteria for use in implementing joint clearances. Prior to the meeting, a senior EPA official suggested that EPA set a criterion of zero spore growth for determining whether decontamination had been successful in each building. However, no frame of reference existed for this criterion. The meeting between CDC and EPA concluded with the decision to use best professional judgement in reviewing the data to determine when the remaining buildings were ready for reoccupation.

In mid-December, the decontamination of the Ford and Longworth Buildings was completed and the Incident Commander requested a written report from the cleanup teams. The EPA began the report as a narrative of the decontamination of the Ford and Longworth Buildings; the number of entries in the report grew quickly until it was massive in size, with more data included each day. In mid-December, the first versions of the Longworth and Ford reports were presented to the response team science advisors (Figure 4.2). The advisors asked for air sampling to be performed to test for the presence of airborne anthrax spores. Therefore, air sampling was performed at the Hart, Longworth, and Ford Buildings (Section 4.2.2).

During the first week of January 2002, Dr. Silva provided Dr. Stutz with a proposal for a formal review working group, comprised of technical experts and individuals involved with sampling and decontamination (including representatives from EPA, CDC, the Agency for Toxic Substances and Disease Registry [ATSDR], CHPPM, and Ecology and Environment [E&E]). That proposal led to the formation of the review working group two days later. The review working group convened a sequestered meeting that lasted over a week in early January to review

the decontamination processes implemented at the Longworth, Ford, and Hart Buildings. The working group reviewed the following:

- The characterization of contamination at each building
- The characterization of "hot" areas within each building
- The selection of the type of decontamination
- The implementation of decontamination methods (the practices and procedures followed)
- Surficial verification sampling processes and results
- Air verification sampling processes and results

As the review working group evaluated the data, they cleared individual areas in each building and eventually each building as a whole. For each building, Dr. Silva drafted a document, which was reviewed by attorneys and signed by representatives from EPA, CDC, NIOSH, CHPPM, and ATSDR. This document was then presented to the leadership of EPA and CDC, who then signed a release document. Both of these documents were delivered to the Incident Commander, who then gave it to the attending physician, who sent a letter of concurrence to the Capitol Police Board (CPB). Through this more formal review process, the Ford, Longworth, and Hart Buildings were cleared for reoccupation. The joint clearance of these buildings was presented in a joint statement by the EPA and CDC.

In early April, the entire P Street Warehouse was cleared according to the formal review working group process. The signatories for the P Street Warehouse clearance document were representatives from ATSDR, NIOSH, EPA, and Silva Consulting Services (SCS), with EPA and CDC releasing a joint statement.

Difficulties Encountered

Clearing buildings for reoccupation was hindered by the uncertainty that was caused by the unprecedented nature of the response. The release of millions of anthrax spores had never occurred in an occupational setting. There were no templates, guidances, or standard operating procedures to follow. The greatest difficulty involved the establishment of reliable cleanup

criteria for anthrax spores. Without established cleanup criteria, no single entity within the structure of the ICS would agree to be ultimately responsible for allowing reoccupation of the decontaminated buildings. In addition, several key decision makers initially were not available. CDC and NIOSH left the site after the first few weeks of the response and then became involved again toward the end of the decontamination. Because of the lack of key decision makers, no health risk assessment was performed and there was no articulation of cleanup criteria. Instead, the joint clearance process was forced to depend on a consensus among the key response team leaders.

The large volumes of data were cumbersome to organize and review. The data management system evolved constantly. In many instances, the data were not appropriately quality checked for accuracy of location of sample, sampling time, or sample purpose. It was difficult for the review working group to assess if the characterization sampling had been adequate or if the number of samples taken were appropriate for the size of the room or area. As a result, the review working group initially recommended further characterization in some cases.

Successes

The buildings were successfully decontaminated, and the process of jointly reviewing the pertinent data and clearing the buildings was effective. None of the responders or the persons who re-occupied the buildings have exhibited any symptoms of exposure to anthrax spores. The cooperation of several agencies was important to this success; without such cooperation, safe reoccupation of buildings would have been delayed significantly.

Lessons Learned and Recommendations

The need for analytical cleanup criteria for anthrax in an occupational setting persists. However, if there is a similar release of anthrax before such criteria are established, the methods used in this response could serve as a template for joint clearances. Greater scientific confidence in

releasing decontaminated buildings could be achieved if health risk assessments are developed and used to form a basis for appropriate cleanup criteria, and sampling and decontamination protocols. Such criteria should be developed cooperatively by an inter-agency network of government representatives and consultants.

Data management techniques used for conventional emergency responses could not accommodate the needs for the rapid review and assessments of the large volumes of data being generated rapidly and circulated to response personnel throughout numerous rooms and buildings. Therefore, improvements in data management techniques are recommended. When available, visual photographic documentation of sampling locations proved helpful to the review working group, and it is recommended that accurate building plans be used to visually document sampling locations. It is also recommended that responding agencies consider using an unbiased outside organization to be a part of the structure of the ICS to perform quality assurance (QA) and quality control (QC) of sampling data.

A formal joint clearance process should be established as soon as the need for building decontamination is identified. Such early establishment would have resulted in a more rapid reoccupation of the buildings. It is recommended that a joint clearance process be developed initially so that it can be used to guide the response, rather than being developed just prior to the completion of decontamination.

4.3 Sampling

This section discusses three primary aspects associated with sampling, including sampling plans, sampling implementation, and data.

4.3.1 Sampling Plans

This section describes the methods and procedures used to develop the sampling plans that were used for initial, characterization, and verification sampling. This section also describes a re-aerosolization study that resulted in a better understanding of where samples should be collected.

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding the development of sampling plans.

Sequence of Events

During the first 10 days of the response, NIOSH was in charge of sampling to determine the extent of contamination in the Capitol Hill area. Approximately 20 to130 initial samples were collected per building depending on location and function. Initially, investigators were looking for more letters containing anthrax. Samples were collected along delivery route of the mail. The HVAC system was also sampled in the Daschle stack (vertical zone) of the Hart Building. In the Dirksen Building, CBIRF sampled all of the mail drops. At this time, no formal written sampling procedures were in place, but CDC guidance was followed. Sampling plans were written on top of existing construction plans for the various buildings obtained from AOC. Once the plans were written, they were given to sampling teams along with 5-gallon buckets filled with sampling equipment.

In mid to late October, NIOSH indicated that it would not be preparing plans for verification sampling. On October 27, EPA was tasked with verification sampling, and NIOSH continued preparation of characterization sampling plans. During the first ten days of the response, Capitol staffers were directly calling NIOSH to request sampling activities. After that time, requests were routed through Incident Command for approval.

During late October, OSC Jim Augustyn set up a decision-making position for verification sampling within the ICS. OSC Augustyn asked for contractor support from E&E to develop verification sampling plans. OSCs Augustyn and Durno developed ideas for the plans (building-specific plans), which were then fully developed by E&E. These verification sampling plans were developed and routed through an approval process with the ICS. Revised plans became more consistent and included the following sections: objective, logistics, equipment and personnel, standard operating procedures (SOP)s, and approval.

On November 1, the NIOSH presence at the response was reduced significantly. Throughout the first half of November, further characterization sampling of the Hart Building became a low priority because preliminary decontamination plans indicated fumigation of the entire building. The focus of sampling plan development turned to verification sampling, because it was assumed that no more sampling would be conducted until after the building fumigation efforts.

During the first week of November, OSC Steve Way noticed a gap of expertise in scientific support for the characterization of microbial contamination. OSC Way organized a technical support team/scientific advisory board consisting of Chris Weiss (EPA); Aubrey Miller, MD (PHS); and Bill Daniels, PhD IH (NIOSH). A number of meetings and briefings were held, during which it was concluded that the entire Hart Building should not be fumigated. The scientific advisory board recommended more characterization sampling, since the decontamination strategy was being revised to target specific areas of the Hart Building. OSC Way asked Incident Command to expand characterization sampling at Hart Building and received approval. Sampling activities continued at other buildings. During the second week of November, NIOSH was no longer providing any significant support for the response action.

In mid-November, the preparation of characterization plans for the Hart Building resumed. A sampling approach was defined that followed the three primary contamination pathways:

- Delivery Route of Mail
- Personnel
- AHU and HVAC systems

The mail trail had previously involved following the mail carts, but now all mail handling units were to be sampled. Personnel that were present in the Daschle suite when the letter was opened could have transported contamination out of the suite and presented a second pathway. An epidemiological review provided an estimation of the impact of this potential contamination pathway. The AHU (both return and supply sides) and HVAC systems were also sampled. Preliminary NIOSH sampling results had shown positive results for anthrax.

Sampling plans also included sample collection in common areas of the Hart Building (hallways, restrooms, atriums). Samples were spaced based on a statistical evaluation. Planners also met with asbestos experts because the sizes (1 to 10 microns) and transport properties of anthrax spores were expected to be similar to asbestos particles. The experts helped determine where spores were likely to settle.

As the characterization sampling in the Hart Building progressed, EPA learned from the FBI that the anthrax spores had been formulated with silicates (weaponized), which would potentially allow them to remain airborne for a long time and to be re-aerosolized. This new information prompted testing in the Hart Building to determine whether the spores were likely to re-aerosolize if disturbed. Tests were conducted between November 10 and 24. The results showed that the mixture of anthrax spores and silicate particles could be re-aerosolized and that the diameters of most of the re-aerosolized mixture were in the respirable range (<5 microns). Based on these results, the plans for characterization sampling reflected a much greater concern about migrating spores. Additional decontamination chambers were set up and questions arose about appropriate PPE levels (Section 4.6). In addition, all HVAC systems in the Hart Building were sampled, and characterization sampling was expanded to include secondary contamination (contamination resulting indirectly through contact with contaminated mail). The HVAC sampling revealed that all HVAC systems were clean, except the Daschle stack, and that

secondary contamination of the HVAC system had not occurred. The routes of people who potentially had been exposed to the spores were followed up to the ninth floor, then back down to the fifth floor. The stairs and a nearby ladies room were sampled and showed positive results. Characterization sampling was still being conducted at the Hart Building through late November. Every room in every suite was targeted for characterization sampling. Sampling at the Hart Building was intensive because of the great number of spores that potentially were released when the letter was opened.

After implementation of the Remedial Phase Organization in mid-November, OSCs were assigned to a particular building and began focusing on building-specific plans and activities, including sampling approaches. Sampling activities were conducted concurrently at multiple buildings. By November 20, all buildings, except the Hart Building, were adequately characterized.

Verification sampling plans were developed to determine the effectiveness of decontamination activities at destroying anthrax spores in the air, on surfaces, and in the HVAC systems of various buildings where positive results from characterization sampling were obtained. As with other aspects of this response, no models or protocols were available to follow. Based on the recommendations of a biostatistician, EPA developed an approach to collect numerous samples in every room that was decontaminated. The CDC was asked for air sampling protocols, and initially, there was no response. EPA was looking for information about what air flows should be used for sampling and what type of model should be followed. ATSDR and NIOSH developed an air sampling plan based on asbestos protocols. A variety of air sampling techniques were used, including gelatin filters, DFUs, and cascades (Anderson). Air samples usually consisted of processing 2.5 room volumes of air through DFUs.

A sampling plan for surfaces was developed for verification sampling, which included sampling 10 to 20 percent of an area after decontamination of horizontal surfaces. A sampling grid was used on the floors, walls, and HVAC system. Since non-porous vertical surfaces rarely exhibited

contamination (only two wall samples tested positive during the entire response), one wall and one composite screen sample were collected from vertical surfaces. Ultimately, over 400 verification samples were collected in the 4,000-square-foot Daschle suite.

Difficulties Encountered

Development of sampling plans was problematic for multiple reasons. Planners were working to develop appropriate processes to characterize and verify contamination without any SOPs. As of May 2002, such SOPs still have not been completed. There was an early problem with establishing a reliable conceptual model of the contamination sources to be sampled, especially before the potential for re-aerosolization of anthrax spores was understood. Due to our nation's need to expedite the response, response personnel working long hours under constant pressure could not always follow the limited protocols that were available. The initial and continued use of inaccurate floor plans made the planning for, and subsequent implementation of, sampling a challenge. From early November to late December, input from health agencies regarding sampling for verification of decontamination techniques was limited.

Communication was a major problem associated with sampling plans. Poor communication was apparent between planners and samplers. Incomplete briefings were common, leading to inconsistent data transfer across shifts. The day shift was generally more informed than the night shift. It was difficult to transfer data among on-site personnel, and it was difficult for the USCG Strike Team to implement an efficient communication structure because they were trying to explain a complex structure with which most people were unfamiliar.

Successes

The most significant success is that none of the building occupants presented any symptoms of anthrax exposure after the decontaminated buildings were cleared for reoccupation. The cooperation between multiple agencies and their contractors was a success, and scientific

resources became involved early on in the response to provide assistance. Jim Augustyn (EPA) had the foresight to coordinate an effective planning team. OSCs relied on their past experiences and knowledge to recognize individual and contractor strengths and weaknesses to maximize results. EPA maintained good rapport with the U.S. Navy Medical Research Center (NMRC) lab, which it used for assistance with planning and analysis efforts. Initially, NIOSH and CHPPM educated samplers based on CDC protocols, which also proved to be effective.

Lessons Learned and Recommendations

In the future, OSCs and contractors should be trained in specific QA/QC procedures. OSCs and contractors should also learn, implement, and adhere to a properly functioning ICS for better organization, efficiency, and information flow.

Extensive research being conducted by numerous agencies, such as NIOSH, Defense Advanced Research Projects Agency (DARPA), and EPA, should be coordinated so that any parties involved in similar situations in the future have the same information. Planners should talk directly with samplers to learn about the current situation and any difficulties/problems that are encountered. A master file or situation chart to include plan revisions, schedules, and activities associated with each room or area would be helpful to keep everyone focused on the same objectives and would provide all personnel with the same information across shifts.

To complement building plans or figures, congressional staffers could have been interviewed to help identify inaccuracies on the site maps for their respective offices prior to sampling. In addition, these individuals could have assisted in identifying more accurately the actual mail trail throughout the offices. For example, building plans indicated mail slots on office doors. Therefore, sampling plans indicated to sample those locations. However, samplers later found that the mail slots had been painted over, and therefore were not part of the mail pathway. Early discussion with congressional staffers and early responders could have minimized trial and error by determining the actual pathway for mail as opposed to the theoretical one. In addition to

gaining insight from staffers, it would have been helpful to have maintenance staff or technicians be pre-trained so that they could accompany planners and/or samplers into the zone; this was especially crucial for the HVAC system.

It was important that the phenomenon of re-aerosolization was investigated because it adverted what could have become serious cross contamination issues.

4.3.2 Sampling Implementation

Three phases of sampling activities were conducted during the response (initial, characterization, and verification). Surface and air sampling procedures were involved in all phases. Three types of surface samples were collected during the sampling events: swab samples, wipe samples, and HEPA vacuum samples. Air samples were also collected to determine the extent of contamination. Section 3.0 provides details about initial, characterization, and verification sampling activities at specific buildings.

Initially, swab samples were collected to investigate distinct locations. These samples minimized the potential for cross-contamination, because the procedures used to collect them do not disturb a large area of a potentially-contaminated surface. These samples were collected with wet, non-cotton swabs. Wipe samples were collected to obtain a more composite sample from larger surface areas. Cotton gauze pads or gauze sponges were initially used to obtain these samples. However, it was determined that rayon-polyester gauze worked better because it improved the efficiency of extraction at the laboratory. Swab and wipe samples were used to obtain samples from non-porous surfaces. HEPA vacuum samples were generally used to obtain samples from porous materials that could not be sampled using a swab or wipe.

Air samples generally were used as verification samples and were collected using a variety of techniques. Mixed cellulose ester membrane (gelatin) filters were used to collect air samples over an extended period of time (6 to 8 hours), and DFUs generally were used to sample 2.5

room volumes of air at a rate of 900 liters per minute. A cascade impactor sampler (Andersen sampler) was used to obtain samples for culturing. A fourth type of air sampling involved leaving an auger plate exposed to the air for at least 45 minutes.

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding the implementation of sampling plans.

Sequence of Events

After the letter was opened in the Hart Building, initial sampling was initiated to determine the extent of contamination across the Capitol Hill Complex. Sampling teams obtained sampling plans from the Incident Command Center on D Street, where planning teams were located. Initially, sampling equipment was provided by NIOSH; CHPPM then began providing sampling equipment. CHPPM was also tasked with processing the samples. CHPPM received samples from teams, and processed them with labels and chains-of-custody (COC). The samples were then transferred to the Capitol Police for shipment to one of two analytical laboratories (The U.S. Army Medical Research Institute of Infectious Diseases [USAMRIID] and NMRC).

Approximately 20 to 130 initial samples were collected in each the 26 initial locations (see list in Section 1.1). Typically, numerous samples were collected in each building or room at locations that were most likely to contain spores, based on a conceptual model of how spores could have been released in each building. Approximately 2,200 initial samples were collected, and characterization samples were collected in response to all samples that tested positive for anthrax.

Characterization sampling involved collecting more samples at hot spots to better characterize the full extent of contamination and to help determine the method of decontamination required. Sampling crews were instructed not to disturb areas that were known to be "hot." Characterizing the buildings represented a large portion of the time needed for the response. By November 20,

all buildings were fully characterized (except the Hart Building). The most extensive characterization activities were required in the Hart Building, because the largest quantity of spores were released there. Of approximately 4,200 characterization samples, over 3,000 were collected in the Hart Building. More information regarding sampling documentation and data management is included in Section 4.3.3.

Following characterization and decontamination activities, verification samples were collected to determine the effectiveness of the decontamination. If verification samples tested positive for anthrax, the area continued to be decontaminated until verification samples were negative. Nearly 3,500 verification samples were collected.

Difficulties Encountered

Several difficulties were encountered during sampling implementation, including inaccurate building plans and lack of communication. Most of the building plans obtained from AOC were old and inaccurate. This problem arose during the development of sampling plans and continued through implementation. The sampling plans, based on inaccurate building schematics, sometimes indicated samples to be collected at locations that did not exist. Another difficulty was that samplers were having trouble determining where previous samples had been collected. Rotating teams of samplers and other personnel between day and night shifts, and different personnel mobilizing and demobilizing, made obtaining a historical perspective of sampling conducted to date problematic. Also, precautions used to reduce the potential for cross-contamination during sampling slowed the pace of sampling significantly. In addition, special requests to obtain items from particular offices impeded sampling progress in some cases.

Successes

Over the course of the response, sampling plans became more consistent, resulting in better interpretation and implementation of sampling activities and objectives. Samplers collected over

9,000 samples, few of which were lost. Large amounts of data were managed and provide data of a quality adequate to evaluate the extent of contamination and verify remediation.

Lessons Learned and Recommendations

Several lessons learned and recommendations have emerged, regarding building plans and actual locations, communication, documentation of sampling locations, and specific actions when an inaccuracy is encountered. At the outset of any responses that involve sampling inside buildings, the accuracy of any available building plans should be assessed and sampling crews should be kept up to date in changing the plans. Video reconnaissance was very helpful in obtaining an accurate representation of potential sampling locations, rather than relying on old or inaccurate building plans. It may have been more efficient to have planners conduct entries into the zones to obtain first-hand information about the actual building layout and difficulties that might be encountered during sampling activities rather than having planners work from maps. Planners could then have communicated that information to the samplers, so that they would be more informed about what to expect. Special operations requested by the building evacuees should be minimized because they often resulted in resource constraints and delayed the accomplishment of mission-critical objectives.

Communication systems used to relay information amongst the workers require improvements. A central location or staging area for information is recommended to provide sampling shifts with revisions to sampling plans and activities completed in the previous shift. Samplers should mark sampling locations with colored tape or Post-It notes, and one of the sampling crew should served as a scribe (as was done later in the response). Video and photo documentation of sampling locations also proved useful. Based on sampling methods and results, it was determined that gelatin filters are better than DFUs; also Anderson (cascade impactor) samplers are recommended for obtaining air samples.

4.3.3 Sampling Data

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding the management of sampling data.

Sequence of Events

In late October, the CPB contracted SCS to develop and implement a system for data management. Data were initially stored in a Microsoft Excel spreadsheet file, and results were either reported as positive or negative for anthrax spores. The results were also displayed on electronic building plans (that were obtained from AOC) and scanned into the data input system. This system was cumbersome, especially when multiple samples were collected at one location.

In mid-November, SCS proposed and implemented a revised data management system, including bar codes for samples, data sharing over a secure web site, and a Geographic Information System (GIS)-based program rather than the scanned building plans. COCs and sample labels could now be generated electronically. This revised method eliminated the QA time for manual data entry. Although this new method was easier for the laboratory, it caused initial confusion among the samplers. Initially, there were duplicate identification numbers, and sampling dates were occasionally incorrect on COC forms. However, the laboratory could now access and update sample information remotely, reducing the previous delay of up to 4 to 5 days to communicate sample results. By early December, verbal results from the laboratory were received within 24 hours, and bar codes and unique identification numbers were used for each sample.

EPA OSC Mark Durno evaluated all sampling results. OSC Durno discussed specific samples and sampling events with the samplers to obtain insight that could affect decisions regarding further sampling needs. OSC Durno would then forward the data to Dr. Stutz, who would relay the necessary information to OSC Rupert, appropriate building OSCs, members of Congress, and other persons who were authorized to view the results.

Table 4.3 summarizes samples collected at the seven contaminated buildings. The table presents the purpose of the samples (including initial, characterization, and verification) and the number of positive results.

Table 4.3: Total Number of Samples and Positive Results by Intent of Sample and Building

Building	Intent of Sample	Total Number of Samples	Number of Positive Samples
Dirksen Building	Initial	[redacted]	
	Characterization		
	Verification		
Ford Building	Initial		
	Characterization		
	Verification		
Hart Building	Initial		
	Characterization		
	Verification		
Longworth Building	Initial		
	Characterization		
	Verification		
P Street Warehouse	Initial		
	Characterization		
	Verification		
Russell Building	Initial		
	Characterization		
	Verification		
Supreme Court Building	Initial		
	Characterization		
	Verification		

Difficulties Encountered

Responders generally perceived poor communication in the transfer of data to on-site personnel. Many samplers and other on-site workers did not know which areas had tested positive, which led to issues such as exposure anxiety. Data also were not transferred efficiently between shifts, mainly because personnel did not know how to retrieve the data. Revisions to the data management processes in the middle of the response proved to be a challenging but wise decision. Data and sample location maps were needed and available, but many personnel did not know how to obtain them.

Other difficulties involved the interpretation of negative sampling results (viable spores of *B. anthracis* not detected in the sample). To date, no sample efficiency data are available to scientifically and statistically interpret results for *B. anthracis.* A result of "zero viable spores" cannot be related to a concentration. As such, risk-based determinations are estimated, and the only true assurances are that, in the areas sampled appropriately, high levels of spore contamination are not present when results are negative. Data were interpreted using best professional judgement by knowledgeable individuals with multi-disciplinary training, prior to releasing any building or areas for re-occupancy (Section 4.2).

Successes

A data management system was implemented early in the response. Although this system was modified as the response progressed, the system was crucial in keeping data results organized. Ultimately, nearly 10,000 initial, characterization, and verification sampling results were stored in this system.

Lessons Learned and Recommendations

As learned with the initial data management system, a poor system can slow the entire response and cause delays in other activities. A data management system template for biological threats should be developed for future potential events to avoid future delays or confusion. Risk-based cleanup criteria should be developed against which to compare results. A system using GIS-based units should be developed because such a system would allow for flexibility and could accommodate large amounts of data. Consistent decontamination processes should be developed based on the analytical data.

4.4 Decontamination

This section discusses four main activities regarding decontamination: bag, tag, and tote; on-site decontamination; fumigation; and off-site decontamination. The fumigation and off-site decontamination sections also discuss the use of spore strips as part of those activities.

4.4.1 Bag, Tag, and Tote

EPA defined critical items as items that were critical to congressional operations or personal effects of significance. These items were bagged, tagged, and stored on-site in conex boxes prior to off-site decontamination, after which they were returned to the proper office and owner. The parties involved in this process included: EPA CID, FBI, CBIRF, USCG, START and ERRS personnel. EPA CID performed specialty operations and mail removal for evidence; the USCG removed artwork from the buildings for decontamination and the START and ERRS teams bagged and tagged the remaining critical items from the buildings.

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding bag, tag and tote activities.

Sequence of Events

On October 16, EPA CID arrived at the site to assist the FBI with evidence retrieval and conducted sampling, mail removal, and retrieval of room keys on October 19. The USCG mobilized to the site on October 16 and began removing artwork from the Hart Building on November 3. START and ERRS teams mobilized to the site on October 16 and began bag, tag, and tote operations on October 24. Bag, tag, and tote removals of items other than evidence and artwork occurred in three buildings: Hart, Longworth, and Ford. Items in the rooms within each building were selected for removal when positive samples were found in the room. Given that there were items present in the room that potentially could be damaged during on-site decontamination, either by topical treatment or fumigation, the items were bagged, tagged, and toted off site for treatment.

A formal SOP for bag, tag and tote activities was submitted on November 17. However, standard procedures to document the types and the locations of the items inside a suite were not instituted formally; instead, specific plans were produced on a daily and weekly basis. The primary mission during the response was decontamination. Therefore, bag and tag was performed as time permitted rather than as its own mission. The schedule of bag and tag operations was dependent on the schedule for decontamination activities. The majority of bag and tag activities in the Hart Building were performed prior to fumigation with ClO_2 gas. However, bag and tag activities were performed a second time following the fumigation in response to individual requests from members of Congress or their staff.

The items that were removed from the buildings were categorized into five groups, of which the first four are categorized as critical items: evidence; mail and packages; art and other valuables; miscellaneous critical items (non-evidentiary mail and packages); and garbage. EPA CID removed evidence from various mail rooms in the Hart, Longworth, Dirksen, and Ford Buildings. The process included removing all mail, double-bagging it, drumming it, labeling it, and documenting the drums with a COC. The evidence was stored on-site and later transferred to

FBI custody. The USCG Strike Team removed the artwork and other artifacts from the Hart Building in accordance with a specific plan that was a component of the overall IAP. Wearing Level B PPE, members of the Strike Team conducted reconnaissance of the building, attended detailed training with Capitol curator personnel, constructed artifact decontamination and storage chambers in the Hart Building, and removed and decontaminated artwork. START and ERRS teams bagged and tagged all remaining critical items, and non-evidentiary mail and packages, as well as all remaining garbage for subsequent disposal.

START and ERRS personnel generally followed the November 17 SOP that involved entering the room, removing the critical items from the original location and placing them in a bag, sealing the bag, affixing the label to the bag, and recording the contents of the bag on the label. DynCorp personnel maintained an electronic inventory of all critical items that START and ERRS personnel removed. Approximately 3,250 bags of critical items were bagged, tagged, stored, and transported for EtO treatment at Sterilization Services, Inc. in Richmond, Virginia. Further details about the off-site decontamination of critical items are presented in Section 4.4.4.

Approximately 4,000 packages and other mail were later collected from the mail rooms of the Ford and Dirksen Buildings and transported off-site for decontamination. The packages originally were sent to the Brentwood Post Office, then sent to the P Street Warehouse for storage, and ultimately sent to Beltsville for ClO_2 fumigation. All drums of mail were sent to a USPS facility in Lima, Ohio for irradiation treatment (Section 4.4.3.1).

Difficulties Encountered

The plan for bag, tag and tote changed daily, therefore making it difficult to coordinate between teams of START and ERRS personnel. Plans often changed during an operation, thus slowing down the process considerably. In addition, the floor plans were often inaccurate, which made it difficult to document the rooms where bag, tag, and tote activities needed to be conducted, and those rooms where such activities were complete. Entry teams were often provided with

erroneous information regarding quantities of mail and layouts of rooms. Many resource and time constraints limited the efficiency of personnel performing bag, tag and tote operations. Therefore, these activities could not keep pace with decontamination operations, thus rushing the removal process and decreasing the level of care taken to separate critical from non-critical items.

The definition of critical items changed almost daily, making it difficult to monitor the types of items that teams were removing. Maintaining the inventory of critical items, therefore, was difficult.

Successes

All bag and tag operations were completed with the desired result of removing all necessary items and transporting them off-site for decontamination. The plan developed by Christian Matta (EPA) and curator personnel greatly improved the efficiency and effectiveness of artwork and artifact removal. Multiple contractors and agencies were involved, and the cooperation was excellent. In addition, the sharing of resources helped move the process along and was successful.

Lessons Learned and Recommendations

The primary lesson learned from the bag, tag and tote process regarded the definition of critical items. Throughout the response, the definition of critical items was vague and constantly changed. This made it difficult for the START and ERRS teams to perform bag and tag consistently. It also created a problem with off-site decontamination. The loose definition of critical items led to inconsistent judgement calls on the part of individual personnel, resulting in heterogeneous bags of items, many of which were later determined not to be critical (mousepads, coffee mugs, music CDs, and expendable office items like staplers, hole punchers, and paper clips). The heterogeneity of the contents eventually led to difficulties in establishing an

acceptable method of decontamination. In the future, it would be useful to define critical items more specifically and to adhere to those definitions. One possibility would be to perform a cost/benefit analysis to determine which items were economical to remove and decontaminate, rather than dispose and replace.

The critical item inventory system required the most time during bag and tag. In many cases, the items that were inventoried were not critical enough to be inventoried and were often disposed of later. To avoid wasting resources in the future, it is recommended to use an inventory system that documents only those items that are critical, and identifying all other items generically rather than individually. In addition, it would be beneficial to improve the labeling scheme because several labels fell off the bags. One recommendation might be to write the identification number directly on the bag with a permanent marker.

Prior to the fumigation of the Daschle suite, teams bagged and tagged some critical items to prevent them from being damaged by the ClO_2 gas. However, the teams did not remove all of the critical items before fumigation and later removed remaining critical items after the fumigation. The process was completed twice, thus decreasing the efficiency of the bag and tag process.

Many electronic items were packaged improperly and were eventually disposed. In many cases, they were packaged in the same bags along with heterogeneous items, which caused damage to the delicate electronics of the item. In future responses, electronic items should be handled with care and packaged separately from other items and with proper supervision to ensure that the process is completed properly. Another recommendation that would facilitate proper handling of electronic equipment is to bag and tag items according to the type of item in addition to the locations from which they came.

The equipment used by the START and ERRS personnel for bag, tag, and tote activities was not adequate. The bags were opaque, which made the inventory process difficult. Using a clear bag

will enable personnel to inventory the items without opening the bag, and to better segregate waste from critical items. In addition, using a brightly colored bag or sticker to identify garbage would also aid in the efficiency of the inventory system. Polyethylene bags were not appropriate for EtO treatment because they did not allow for maximum contact time between the gas and the items inside the bag. When decontaminating a bag of items with EtO, it is recommended to use tyvek bags.

The reconnaissance that START and ERRS personnel conducted prior to critical item removal was not adequate. It is recommended that one major reconnaissance event occur prior to bag and tag and decontamination, during which digital photographs would be taken. This process would improve the accuracy of critical item documentation and assist the bag and tag teams in performing their tasks more efficiently.

An additional recommendation would be to increase the level of supervision over entry teams conducting bag, tag and tote to ensure that the correct items are selected. CID also recommended that EPA provide entry teams with the adequate amount of time to complete the bag and tag mission.

4.4.2 On-Site Decontamination

Four types of on-site decontamination were used during the response: ClO_2 liquid, HEPA vacuuming, Sandia foam, and ClO_2 fumigation. Due to its significance, the ClO_2 fumigation effort is addressed in a separate section (Section 4.4.3).

Table 4.4 summarizes the types and locations of on-site decontamination methods that were applied during the response.

Table 4.4: Methods and Locations of On-Site Decontamination Applied During the Response

Method of Decontamination	Building Where Method Was Used
ClO_2 liquid	Supreme Court Building Longworth Building Ford Building (bomb squad offices) Hart Building P Street Warehouse Russell Building
HEPA Vacuum	Dirksen Building Ford Building Longworth Building Hart Building P Street Warehouse Russell Building Supreme Court Building
Sandia foam	Ford Building mail room Dirksen Building mail room Hart Building

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding on-site decontamination.

Sequence of Events

When decontamination methods were initially discussed, there was an uncertainty about the effectiveness of bleach; therefore, the response personnel explored alternative methods. DARPA verbally presented good test data showing the effectiveness of Sandia foam. Therefore, the foam was selected as the initial method of decontamination. Although Sandia foam is not classified as a sporicidal agent according to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the foam was chosen based on claims regarding its ease of application and removal, and its low impacts to the applied surfaces. A FIFRA crisis exemption was issued on November 16 for Sandia foam.

The foam was applied in the mail room of the Ford Building on October 26. The foam was difficult to apply and cleanup and left a yellowish stain on surfaces. The foam then was used in the mail room of the Dirksen Building on October 27. Following this round of decontamination, a number of verification samples tested positive for anthrax. Concerns arose regarding the effectiveness of the foam, which remained difficult to clean up. EnviroFoam Technologies, the company that manufactures the foam, claimed that the foam was not applied properly in the Dirksen and Ford Building; therefore, they further trained the response personnel in proper foam application techniques.

Following the foam applications, other decontamination methods were considered. It was decided to use ClO_2 liquid. ClO_2 is an antimicrobial pesticide, which has been recognized for its disinfectant properties since the early 1900s. In 1967, EPA first registered the liquid form of ClO_2 as a sterilant. On November 9, EPA issued a crisis exemption under Section 18 of FIFRA for the limited sale, distribution, and use of ClO_2 liquid for the Capitol Hill Site response.

Prior to applying ClO_2 liquid, HEPA vacuums were used to remove the majority of the spores. Rooms and areas were isolated and negative air machines were placed to prevent air in isolated areas from entering uncontaminated areas. HEPA vacuum activities were conducted in the Ford, Longworth, and Hart Buildings and the P Street Warehouse. Items were also HEPA vacuumed before they were bagged for removal.

ClO_2 liquid had been approved as a sporicidal agent, and a ClO_2 generation unit, which had been mobilized to the site for use in fumigation activities, was capable of generating large volumes of ClO_2 liquid. However, the ClO_2 generation unit could not generate small daily quantities of ClO_2 liquid that were needed, and it was not practical to store a large quantity of the ClO_2 liquid on-site. Therefore, smaller quantities of ClO_2 liquid were prepared (a few liters at a time) using mixes that were manufactured and prepackaged by Vulcan Corporation. To prevent off-gassing and the potential for exposure of workers to harmful ClO_2 vapors, the prepackaged mixes were diluted with water to a concentration of 500 parts per million (ppm).

The following procedure was generally followed in all buildings:

- Isolate the area to prevent the cross-contamination of rooms
- Seal air intakes and establish negative air pressure
- HEPA-vacuum items before critical item removal
- HEPA-vacuum floors, walls, and other surfaces
- Spray ClO_2 liquid on all surfaces (allow contact time of at least 30 minutes)
- Remove carpet and other non-porous materials for disposal
- Conduct verification sampling

ClO_2 liquid was first used to decontaminate mail slots inside the Supreme Court Building post office on November 1. Following decontamination, about 10 percent of the verification samples tested positive. Therefore, START and ERRS teams re-entered the post office, applied ClO_2 liquid a second time and removed the mail slots for proper disposal.

The first large-scale use of ClO_2 liquid for decontamination was at the Longworth Building on November 25. Four entire suites (1605, 1630, 1632, and 1740/1741), including walls, desks, bookshelves, and floors, were decontaminated using ClO_2 liquid applied with Hudson sprayers. All verification samples were negative. A field-test was conducted before verification samples were collected to determine whether a decontaminated area was dry.

Once the Daschle suite of the Hart Building was isolated, items were HEPA vacuumed and then left in the suite. In addition to applying ClO_2 liquid to items and areas, ClO_2 gas was applied when fumigation equipment was installed. ClO_2 liquid was also applied after equipment placement to help reduce tracking, since some isolations were broken by workers placing equipment. Following fumigation, hot spots were detected and treated. These areas were retreated with a HEPA vacuum and ClO_2 liquid, according to the decontamination plan, and then the areas were re-sampled.

Several weeks after foam was applied in the Ford and Dirksen Buildings, Sandia foam was also used in the Hart Building (in mid-November) for vertical surfaces (such as elevator walls) that required a longer contact time than could be achieved with the ClO_2 liquid.

HEPA vacuum decontamination activities were conducted in the bomb squad offices of the Ford Building from November 16 through 20, and most verification results were negative. However, the lockers in the bomb squad office were found to be contaminated. The lockers contained equipment that had been taken to the Hart Building during the initial response. ClO_2 liquid was applied on December 2 to the workbench, sink, and lockers. Verification samples tested positive. On December 9, items were removed from the lockers (and disposed off-site), before a second round of ClO_2 liquid was applied. A third round of ClO_2 liquid was applied on January 8 because of a positive sample from a gelatin filter on a personal monitoring device. This round was the most thorough application and lasted about 2 hours.

The decontamination activities at the Longworth Building occurred simultaneously with activities in the Ford Building. However, the contaminated area was more confined in the Longworth Building. Following the first application of ClO_2 liquid on November 25 and 26, one verification sample tested positive for anthrax. A second application of ClO_2 liquid was applied on December 8. All subsequent verification samples tested negative for anthrax.

The basic steps were the same at the P Street Warehouse as for the other buildings; however, limited porous surfaces were present in this building and no HVAC system was present. Several areas were released for re-occupancy based on characterization sampling in November. This facility was decontaminated in two phases, and a portion was released for re-occupancy in December/January.

If results from items inside a building were positive, the items were re-treated, and re-sampled. If verification samples from drawers were negative, they were taped shut. After a positive result in the Ford Building, however, those drawers were untaped, and ClO_2 liquid was reapplied, in

addition to all other surfaces. The surfaces of the drawers were then re-sampled and all results were negative.

Difficulties Encountered

Several difficulties were encountered regarding on-site decontamination, primarily with planning and communication. Planning was affected by several factors. Constant pressure to finish the project may have limited planning. Initially, old building plans were used that were not representative of the actual construction. For example, walls were in different locations and isolations were inaccurately depicted on the figures. Even though the building plans were known to be wrong, they continued to be used because they provided a starting point for planning. Reconnaissance was an important and critical activity; there was an initial resistance to reconnaissance, which affected planning and decontamination activities. The planning process, in general, improved throughout the response.

Several issues were noted regarding re-occupancy of the buildings after the decontamination process, including residual odor and its effect on items that remained in the area.

Communication was another difficulty encountered for on-site decontamination. A lack of communication between shifts, especially at the Hart Building, made it difficult to determine the activities conducted on a previous shift, such as which isolations were built and which areas were decontaminated. Even within shifts, communication between teams was limited. Feedback from reconnaissance operations was not consistently relayed to a central location.

As with most other aspects of the response, no procedures or methods had been developed previously for decontaminating buildings contaminated with anthrax. The trial and error process was challenging, yet effective.

Another difficulty encountered during the response was the limited access to the site, especially at the Longworth and Ford Buildings. This factor severely limited the amount of work that could be conducted. It was also difficult to track the areas that were actually treated, especially in common areas of the Hart Building. Although this could be considered a data management issue, it also affected decontamination activities.

Successes

The most significant success regarding on-site decontamination was that no one was infected with anthrax during or after the response and all buildings were reopened. The multi-agency and multi-contractor cooperation was outstanding, even under the intense pressure to expedite all response activities. During the response, the state of the science (decontamination methods for anthrax) was advanced. The trial and error process proved effective, and the use of sampling results to guide the decontamination activities helped make the removal manageable.

Lessons Learned and Recommendations

From the difficulties encountered, several recommendations can be made. During planning, accurate building plans are important, and building plans that are known to be inaccurate should not be used (Section 4.3.2). Reconnaissance should be conducted with digital photographs to obtain or verify correct information. Based on the decisions made and activities conducted, vendors should be identified for approved, validated ClO_2 solutions. This approach will reduce the trial-and-error and minimize valuable time lost conducting such activities. Additional decontamination methods should continue to be evaluated for possible future use.

4.4.3 Fumigation

EPA identified ClO_2 gas as the best available fumigant for decontaminating the Hart Building, as well as to fumigate mail and personal packages. EPA used ClO_2 gas during three fumigation

events in the Hart Building and a series of seven fumigation events at the USDA Agricultural Research Center in Beltsville, Maryland. The first fumigation occurred in the Daschle suite in the Hart Building, followed by two attempts at fumigating the HVAC system in the Hart Building. Later in the response, ClO_2 gas was used at the Beltsville location to fumigate mail packages and other critical items. Fumigation with ClO_2 gas was chosen for those areas with the highest concentration of anthrax spores where topical decontaminants were not adequate. ClO_2 gas was also chosen for its ability to penetrate small areas that could not be reached with topical treatment.

Spore strips were first used during trial tests of fumigation with ClO_2 gas at the Brentwood Postal Facility in Washington, DC. At Brentwood, EPA conducted a series of 12 tests in a mail trailer, using ClO_2 gas and a variety of *Bacillus* spores as surrogates for anthrax spores. Based on the test results from Brentwood, ClO_2 gas emerged as the best option for fumigating the Daschle suite and HVAC system in the Hart Building, and later the packages and mail in the trailer at the Beltsville Agricultural Research Center.

The following subsections provide separate discussions of the sequence of events, difficulties encountered, successes, lessons learned, and recommendations in regard to fumigation activities (Section 4.4.3.1) and the activities involving placement, collection and interpretation of spore strips (Section 4.4.3.2).

4.4.3.1 Fumigation Activities

On October 19, EPA drafted a list of possibilities for decontaminating the Hart Building. Response personnel formed a team of advisors to investigate decontamination methods that would be effective while causing the least amount of damage. The team researched alternative fumigants such as ClO_2 gas, bleach, ozone, paraformadehyde, and hydroxyl radicals. They chose ClO_2 gas as the best available option because it was expected to cause minimal disruption to the suite and because it was expected to be the most effective option for destroying the high

concentration of anthrax spores in the Daschle suite. Available published data suggested that liquid and gaseous ClO_2 would reduce bacterial spore populations under specific conditions, including concentration, pH, and contact time. On October 25, EPA chose ClO_2 gas as the decontamination method of choice, in both liquid and gaseous forms. At that time, Fred Prior of the CPB made the decision to use gaseous ClO_2 fumigation in the Hart Building. On October 25, OSC Rupert began to draft a proposal recommending ClO_2 gas as the fumigant of choice.

As a preliminary trial of ClO_2 fumigation, EPA proposed fumigating the Dirksen Building. This proposal was rejected because the air exchange between the Dirksen Building and other uncontaminated buildings posed a threat for spreading the ClO_2 gas to the other buildings, which had not been cleared of critical items. EPA also proposed a trial run at the Ford Building; this was also rejected for a number of reasons, including the proximity of a day care facility.

On October 28, Jeri Thompson (Secretary of the Senate) and Assistant Administrator Marianne Horinko (EPA) discussed the best approach for using ClO_2 gas as a fumigant. On October 29, a team that included OSC Rupert, Tom Voltaggio, Paul Schaudies, and Bethany Grohs, attended a meeting with the Administrator to explain the plan to fumigate the entire Hart Building in two weeks, pending peer review. Subsequently, EPA assembled a team to draft the plan and SOP for ClO_2 fumigation. Later that day, the above-mentioned EPA team met with Senator Reid, along with the Deputy Surgeon General and attending physician to discuss the technical details of the plan. After that meeting, Marianne Horinko gave a speech to the Senators explaining the process proposed in the plan, after which she addressed 200 staffers about the situation and the proposed plan.

On the morning of October 30, Marianne Horinko met with Senator Daschle to provide him with additional details of the approach, emphasizing its scientific validity. On that same day, Senate leadership made the statement that the Hart Building would be cleaned and prepared for re-entry by November 13. On October 31, a 48-hour peer review of the proposed plan and SOP was initiated, in which reviewers were asked the following questions:

- Is fumigation appropriate?
- Is ClO_2 gas appropriate?
- Should EPA fumigate the entire building?

On November 4, EPA presented the results of the peer review, indicating that all reviewers agreed that ClO_2 fumigation was the best option available to address the contamination in the Hart Building. However, most reviewers expressed uncertainty about fumigating the entire building. Based on the comments from the peer review, EPA scaled down the approach to a step-wise project that would begin by fumigating the Daschle suite, followed by the fumigation of other areas as necessary. EPA also extended the completion date for this activity. A significant portion of the extension resulted from the need for more detailed characterization sampling in various rooms and common areas of the Hart Building to support a step-wise approach. EPA began drafting a new plan to further characterize the suites and isolate the areas for fumigation and continued evaluating the specifics of the design. After November 4, the remediation plan continued to consist of an evolving collection of documents.

On November 30, EPA issued a crisis exemption for the limited sale, distribution, and use of EPA-registered pesticide products containing ClO_2 gas for fumigating areas within the Hart Building only. The crisis exemption was in effect for 15 days and was automatically extended after an application for a public health exemption was submitted by the end of the 15-day period. The exemption was extended to include other contaminated buildings in early December.

EPA contractors drafted seven versions of the remediation plan for fumigating the Hart HVAC system. The first plans were an approved conceptual design, submitted on December 5, followed by a final design on December 6. Three addendums were written prior to the first fumigation of the HVAC system, and another addendum was issued prior to the second attempt. The first addendum was issued on December 7, the second on December 14, the third on December 16, and the fourth was approved on December 27. A final report summarizing the design of the fumigation was finalized in February 2002.

In preparation for fumigation, the USCG's National Strike Force removed art work from the Daschle suite and surrounding suites (Section 4.4.1). START personnel placed spore strips, containing *Bacillus* bacteria enclosed in a glassine envelope, in the Daschle suite (Section 4.4.3.2). The spore strips were used as indicators of the effectiveness of ClO_2 gas at killing bacterial spores that are similar, if not more resilient, than anthrax spores. START personnel also properly sealed the Daschle suite from the surrounding suites to prevent any leakages of ClO_2 gas during the fumigation.

Concurrently with these activities, EPA conducted tests of the sporicidal effectiveness of various concentrations of ClO_2 gas at a number of temperature and humidities, and under a number of spore location scenarios (such as in desk drawers, and porous and non-porous surfaces). These tests involved the use of spores from bacteria that were similar to anthrax, but not dangerous to humans. These spores were pre-mounted on spore strips and placed at various locations within test chambers. The tests were conducted at the at the Brentwood Postal Facility and at Southwest Research Institute (SwRI). Based on these tests, EPA determined that the conditions for fumigation should include 75 percent relative humidity, a temperature of 75°F, and a target concentration of ClO_2 gas of 750 parts per million volume (ppmv) maintained for 12 hours. It was verified from the research that appropriate temperature and humidity levels were crucial to maximize the efficacy of the ClO_2 gas, and should be maintained as high as possible rather than increasing the ClO_2 concentration.

At the start of the process for fumigating the Daschle suite, steam was introduced into the suite until humidity levels reached the target level. Meanwhile, ClO_2 was generated in aqueous solution outside the Hart Building and was delivered into the building through a large pipe after target temperature and humidity levels were sustained. Once inside the building, the solution was delivered through an air stripper and into the Daschle suite in gaseous form.

To ensure that the ClO_2 gas was evenly distributed, circulating fans were operated at strategic locations as the ClO_2 gas was infused into the treatment areas. In addition, temperatures,

humidity, and ClO_2 concentrations were monitored and adjusted as necessary throughout the exposure period.

After 12 hours passed, ClO_2 gas was no longer emitted into the suite and the scrubbing process began. To remove the ClO_2 gas from the suite, a caustic bisulfite solution was delivered into the suite through piping to react with the ClO_2 gas and destroy it. The scrubbing process continued until all the ClO_2 gas was removed from the suite.

START personnel monitored the concentration of ClO_2 gas during the fumigation by collecting an air sample every 10 to 15 minutes from numerous sampling locations. The concentration of ClO_2 gas was calculated by feeding the air sample through an impinger containing 15 milliliters of a strong potassium iodide buffer and one gram of iodide crystals for 3 to 5 minutes at 1 to 2 liters per minute, thus capturing the ClO_2. The sample was then added to 150 milliliters of distilled water and titrated with sodium thiosulfate. Based on the result of the titration, the concentration of ClO_2 was calculated.

ClO_2 gas has the potential to irritate the skin and respiratory tract at low concentrations, and is fatal at high concentrations. However, it rapidly disperses and decays under normal environmental conditions. Therefore, EPA monitored the concentration of ClO_2 gas in the outside air surrounding the entire Hart Building complex during all fumigation events using the trace air gas analyzer (TAGA) mobile laboratory. This monitoring activity was conducted to ensure the safety of the local community during the fumigation.

Spore strip results indicated that an adequate level of kill was achieved (Section 4.4.3.2) during the fumigation inside the Daschle suite, thus making further fumigation unnecessary. However, results from verification sampling indicated that topical decontamination was necessary in some areas within the suite.

After the Daschle suite was successfully fumigated, the first attempt at fumigating the HVAC system was made; it was unsuccessful because a mechanical blockage decreased the flow of ClO_2 gas entering the system, thus making it impossible to maintain a constant and uniform concentration of ClO_2. In addition, the temperature and humidity levels were less than optimal, and thus decreased the efficacy of the ClO_2 gas.

A second HVAC fumigation occurred between December 27 and December 31. Prior to fumigation, the horizontal return air ducts to the north and south vertical return risers on at floors 2, 4 and 8 were isolated. In addition, the design called for the isolation of the return air mechanical ducts on the ninth floor from the supply side of the HVAC system and the system from the outside air plenums.

Following isolation, the design called for the injection of ClO_2 gas and steam at the bottom of the north and south vertical return ducts, in the vents leading to the horizontal return air ducts on the fifth and sixth floor in the Daschle suite, and at three points on the ninth floor. During fumigation, 150 cubic feet per minute of treated air was removed from the HVAC system through negative air machines. The design also called for scrubbing residual ClO_2 gas from the negative air machine exhaust and venting it to the interior of the Hart Building, specifically the atrium area. After the fumigation was complete, the ClO_2 gas was removed from the HVAC system using the same scrubbing process that was used during the fumigation of the Daschle suite. During fumigation, contracting personnel monitored temperature, relative humidity, and ClO_2 gas concentration at critical points within the building, using air monitoring and operational sampling techniques.

Verification samples and spore strip analysis indicated that the fumigation achieved an effective decontamination of the HVAC system. The fumigation achieved the Food and Drug Administration (FDA) standards for sterilizing levels of sporicidal effects (Section 4.4.3.2), which fully supported the resumption of the operation of the HVAC system.

After the fumigation events at the Hart Building, EPA completed seven additional fumigation runs at the USDA Agricultural Research Center located in Beltsville, Maryland. The fumigation runs occurred in a trailer containing mail and private carrier packages transferred from the P Street Warehouse. A total of 4,307 packages were treated during the seven tests, along with artifacts and uncontaminated package materials. Spore strips were used to evaluate the effectiveness of each fumigation event (Section 4.3.3.2). The exposure concentration and contact time were 9 hours and 1,000 ppm, respectively for runs one through six. Run seven ran at a lower ClO_2 concentration (450 ppm) and for a longer period of time (20 hours). Non-anthrax contaminated items were placed in the trailer for the last run to evaluate the effect of ClO_2 gas on these items and to further evaluate the penetration efficiency of ClO_2 gas.

Wide-ranging ClO_2 sporicidal effects were consistently observed within the treatment unit during the fumigation runs at Beltsville. Post-fumigation composite, HEPA-vacuum sampling of the treated packages did not detect any residual anthrax spore burden. In addition, the fumigation events at Beltsville were a success because they built upon the lessons learned from the Hart Building and successfully decontaminated the mail and personal packages that were successfully returned to their original owners.

Difficulties Encountered

Various Senate and House members were forced to leave their offices during a time of national emergency. To allow the government to resume normal operations and address matters of national importance in a secure environment, it was imperative that the Capitol Hill Site response be expedited. After responders became more aware of the uniqueness of the response, the pace of fumigation improved, but continued to be balanced to allow adequate time to make important scientific decisions related to the safety of responders and future building occupants.

Isolating the Daschle suite prior to fumigation was a challenge. EPA tested various materials as sealants and determined that plastic and foam worked the best. In addition to difficulties

isolating the area, START teams were faced with uncertainty regarding plans that were designed to validate that they had sealed all areas that needed to be sealed. The teams did not understand the building well enough and inaccurate drawings further impeded their progress.

START personnel experienced several difficulties with the fumigation equipment. The fans used for distributing ClO_2 gas were difficult to position because shifting wind directions outside the building caused inside pressures to fluctuate. Proper fan orientation was achieved through trial and error. The equipment for injecting steam into the suite to adjust the humidity was difficult to operate; therefore, the target humidity was exceeded unintentionally, until other methods could be employed to achieve and maintain the target level. These equipment difficulties could have been addressed if a dry run (without the ClO_2 gas) had been conducted prior to the actual fumigation. However, a number of issues beyond EPA's control prevented an opportunity to conduct a dry run.

During the isolation of the HVAC return air system, prolonged exposure to high temperature and humidity caused degradation of duct tape seals. The primary problems encountered in isolation efforts proved to be the existence of undiscovered return air vents, inherent leakages of the duct system, and the expansion failure due to temperature increases of the air-filled bladders used to isolate the horizontal ducts. The leakages caused ClO_2 gas and steam containment issues and prolonged the fumigation time period, which further contributed to additional degradation and increased leakages.

Several problems were encountered while injecting ClO_2 gas and steam into the HVAC system. The stack effect, which is attributed to the steam being applied into the bottom of the system and rising nine stories, caused dilution of the ClO_2 gas. The stack effect was particularly noticeable during the second fumigation when outside air temperatures were significantly colder than during the first fumigation. During the second fumigation, occlusions were installed at the top of the vertical shafts during a system shutdown to inhibit the stack effect.

Steam condensate was problematic for all locations during the first HVAC fumigation. Observations during that event led to the installation of hard-piped, larger capacity, primary feed lines, condensate traps, and shorter secondary feed tubes. This eliminated most of the condensate issues during the second fumigation. During the second fumigation, steam was delivered to all application points in increased amounts, which occasionally overwhelmed temperature and humidity probes. Therefore, monitoring conditions within the HVAC system was sometimes difficult.

Successes

The fumigation events did not result in any releases of ClO_2 gas to the community above 25 parts per billion (ppb). The TAGA that was used to monitor the air surrounding the Hart Building is capable of detecting extremely low levels of ClO_2 (parts per trillion).

Designing and conducting a fumigation event of this size was unprecedented and complex. Considering that this was the first time a large-scale fumigation with ClO_2 gas was attempted in the field, the decontamination was a success. The fumigations lowered the spore load enough so that a second fumigation of the suite was not necessary. In addition, fumigating the suite and HVAC system reduced the number of topical treatments required to completely decontaminate the area.

Lessons Learned and Recommendations

EPA recognized that because the goal of fumigating with ClO_2 gas was to sterilize targeted areas of contamination, it should have sought more assistance from experts in the field of bacterial sterilization. Therefore, in the event of another incident involving biological agents, EPA recommends that an expert in biological sterilization be mobilized to the site to provide advice on the detection, application, and monitoring of biocidal and sporicidal agents.

During the fumigation of the Daschle suite, the piping that introduced the ClO_2 gas into the suite covered a large portion of the treated area. The piping blocked the exposure of some areas to the gas, thus reducing its contact time with potential spores. Therefore, research is needed to develop methods and equipment so that piping and dispersion units do not block the area to be treated.

In addition, it would have been beneficial to monitor the situation remotely. Therefore, additional research should be directed toward using real-time monitoring, using an ultra violet monitoring system as opposed to the impinger samples, and using remote continuous monitoring.

The compressed time frame to complete the fumigation activities meant that certain items were left in the suite. Therefore, an initial attempt was made to minimize target ClO_2 concentration to preserve the items in the Daschle suite. Consequently, considerable time was expended in agreeing to a target ClO_2 concentration. It is recommended that EPA minimize the material in the room and establish a target concentration for each area prior to fumigation in the future.

Additional recommendations include installing more sensor points to more closely monitor variability in ClO_2 concentration, allowing one day to condition the room before introducing the gas (wet carpet and materials down early), and co-locating the ports for temperature, humidity, and ClO_2 gas.

4.4.3.2 Spore Strip Activities Associated with ClO_2 Fumigation

The following subsections present the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding the use of spore strips during fumigation activities.

Sequence of Events

EPA used spore strips to measure the efficacy of the ClO_2 gas during the fumigation of the Daschle suite and HVAC system in the Hart Building as well as at the Beltsville location later in the response (see the previous section). Approximately 3,000 spore strips were used in the Daschle suite, 450 in the HVAC system, and 1,800 at the Beltsville facility. Spore strips used non-dangerous bacteria that are otherwise similar to anthrax. Four steps were involved with using spore strips, including: preparation, placement, removal, and analysis. The Environmental Response Team (ERT), along with Dr. Leighton from the Leighton Laboratory at the University of California at Berkeley, supplied EPA with spore strips and provided a sample protocol for the design and layout of the strips.

Bacillus spores strips were available in two different forms: as an individual spore strips and as a series of strips on a steri-chart. Spore strips were comprised of a single species of bacterial spores deposited on a cellulose acetate media wrapped with permeable glassine paper. Negative controls (NC), which contained no viable spores, were also used to verify that cross-contamination of the spore strips did not occur in the event that at least some of the viable spore strips survived the exposure to the ClO_2 gas. Each individual spore strip had a concentration of 10^5 (100,000) or 10^6 (1,000,000) spores. Steri-charts, containing *Bacillus subtilis (B. subtilis)* spores, were composed of a series of five spore strips containing populations of 10^4 (10,000), 10^5 (100,000), 10^6 (1,000,000), 10^7 (10,000,000), and 10^8 (100,000,000) spores. In addition, positive control strips, each containing 10^6 spores, were removed from the steri-charts (not exposed) and analyzed to confirm the viability of the bacterial spore strips.

The *Bacillus* species used during the fumigation of the Daschle suite and HVAC system were *B. subtilis* (10^4, 10^5, 10^6, 10^7, and 10^8), *Bacillus (B.) stearothermophilus* (10^5), *B. thuringiensis* (10^6), and *B. cereus* (10^6). *B. stearothermophilus* was selected because it is the heartiest of the species and grows at a temperature of 60°C, which results in a lower likelihood of false positives. *B. subtilis* was selected because it is the closest phylogenetically to anthrax or *Bacillus anthracis*

(*B. anthracis*). Because of insufficient supply of *B. thuringiensis* strips, *B. subtilis* and *B. cereus* were substituted in some locations.

The goal of each fumigation with ClO_2 gas was to reduce the number of spores in the target area by at least 1 million-fold, as indicated by findings of no viable spores on spore strips that contained 10^6 viable spores prior to being exposed to the gas. This level of spore reduction is known as a log 6 kill.

Daschle Suite Fumigation

START personnel prepared the spore strips and steri-charts in the Dirksen conference room. REAC contractors, ERT, and Dr. Leighton oversaw the preparation of the spore strips and advised EPA on the design and placement of spore strip assemblages, which were required at each sampling location. Each assemblage consisted of three strips of each bacteria species, two NC strips, and a steri-chart taped to a standard, letter-sized manila folder. The sample folders were prepared in an assembly line format. To prevent contamination of spore strips with common types of bacteria from human contact, all sample media were handled with powder-free, sterile, nitrile gloves, and alcohol-sterilized forceps. Work surfaces were covered with clean laboratory paper.

Each sample folder was assigned a unique location code. This code identified a section of the Daschle suite and the specific location for placement of a folder within that section. Each individual spore strip on the sample folder was identified with a unique sample identification code that incorporated the location code, the bacteria species, and the replica number of that spore strip. Steri-charts were identified with a unique sample identification code as well; the individual spore strips on the steri-chart were not identified.

Spore strips were placed in the suite on November 30. Entry personnel, donning Level C PPE, entered the exclusion zone in four- to five-person teams. The team members placed the

assemblages of spore strips on surfaces that would be exposed to ClO_2 gas, such as desk tops, drawer interiors, walls, cabinets, plenums, floors, and mail slots. Teams secured the folders to the surfaces using packing tape, staples, and pushpins, as appropriate.

The Daschle suite was fumigated from November 30 through December 2. Entry teams retrieved the spore strip samples following fumigation in a relay fashion on December 3. Team members collected the sample folders and inserted a clean sheet of paper in the middle to avoid cross-contamination between the spores strips and steri-charts of each side of the folder. Each sample folder was placed in a 2-gallon zip-lock bag and sealed. As each sample folder was bagged, it was grouped with other folders from the same section of the suite into a legal-size accordion folder. Personnel passed the accordion folder through the fifth-floor decontamination chamber into a three-gallon zip-lock bag held by a team member stationed in the contamination reduction zone (CRZ). This bag was then passed through a portal to the building exterior where it was placed into another three-gallon plastic bag and sealed.

START personnel prepared COCs for each sample folder prior to placement and matched them against the samples that were retrieved from the Hart Building after fumigation. The COCs contained the unique sample identification number for each spore strip that was included in the sample folder.

The samples were placed in an area with confirmed anthrax presence, which therefore rendered them potentially infectious. Therefore, the samples required special handling and shipment. The samples were packed and shipped in compliance with the International Air Transport Association's (IATA) Dangerous Goods Regulations. All spore strips collected from the Daschle suite were sent to SwRI, a BSL-3 level laboratory, for analysis.

In the Daschle suite, viable spores were found at two locations after treatment (with 7 spore strips testing positive). When the positive growth was reported, START crews entered the building

and topically decontaminated the area in which the positive spore strip was located and conducted verification sampling to verify that the area was clean.

The *Bacillus* species used during the fumigation of the HVAC system were *B. subtilis* and *B. stearothermophilus*. A total of 440 individual strips were placed at 11 locations within the HVAC system. A total of 395 strips were initially recovered following the second fumigation and an additional 33 strips were subsequently recovered.

Spore strip arrays were suspended across the horizontal lengths of the HVAC air-handling units at locations on the second, fourth, eighth, and ninth floors. Each spore strip array contained two or three *B. subtilis* steri-charts, two NC strips, six *B. subtilis* strips in clusters of three strips, and six *B. stearothermophilus* strips in two clusters of three strips. The spore strips were usually contained in glassine envelopes. In some cases, steri-charts and individual spore strips contained in Tyvek envelopes were also included to assess the effects of envelope materials on sporicidal effects.

The spore strip arrays were fabricated from stainless steel tubing with spore strips dangling from stiff wire secured to the tubing with a non-adhesive metallic clip. Each array provided coverage of a transect across the opening of the duct. Four arrays were located in each vertical return duct (second, fourth, eighth, and ninth floors) and two to four arrays were located in the ninth floor duct work.

The spore strip sampling arrays were installed prior to heat and temperature control tests. The strips were inspected after the control tests were terminated.

After fumigation, the spore strips were removed from the steel rod, placed in individual envelopes, handled and transferred similarly to the Daschle suite spore strips, and sent to SwRI for analysis. Some strips were sent to a laboratory at Dugway Proving Ground in Utah to reduce the number of strips that needed to be processed within a short time frame at SwRI.

During the first attempt to fumigate the HVAC system, several spore strips were reported positive results after treatment. It was later determined that the humidity was too low, thus making the ClO_2 gas less effective. Therefore, the second HVAC fumigation involved an increase of the humidity, which yielded no positive spore strips after treatment.

During the first week of March, approximately 506 bags of potentially contaminated House and Senate U.S. mail and private carrier packages from the P Street Warehouse were transferred to the USDA Agricultural Research Center in Beltsville, Maryland for decontamination with ClO_2 gas. In addition, various items from the P Street Warehouse and critical items that were not successfully treated during sterilization with EtO were also treated at Beltsville.

Seven fumigation events (runs) were completed at the Beltsville facility. The first six runs took place from March 22 through March 28 and the seventh took place on April 10 and 11. Spore strips were placed in designated locations in a trailer (treatment unit) during each run along with the critical items. The species selected by EPA were *B. subtilis* and *B. stearothermophilus*. Thirty sampling locations were selected within the treatment unit. START personnel placed an array consisting of both individual spore strips and steri-charts at each location. Each fumigation event was evaluated by a total of 255 spore strips. Each array consisted of one NC strip, three individual *B. subtilis* spore strips, and one individual *B. stearothermophilus* spore strip. Steri-charts were placed on the arrays at half of the locations, ten with *B. subtilis* and five with *B. stearothermophilus*. At the locations with steri-charts, an additional NC strip was placed on the array. The spore strips used in each run were enclosed in a tyvek sleeve.

All sample media were handled with powder-free, sterile, nitrile gloves and alcohol-sterilized tweezers to prevent cross-contamination. START personnel constructed the six-foot-long sampling arrays, each consisting of quarter-round plastic molding, on which small gem-clips were attached using a washer and screw. Each spore strip was labeled with a location code and/or the unique identification number in such a way that the spore strip was not obstructed from access to the fumigation gas in any way. Personnel affixed the spore strips on the array

using the gem-clip. Positive controls from each steri-chart were removed and placed in a pre-labeled coin envelope prior to placing the steri-charts and on the array. Positive controls were never exposed to ClO_2 gas to document spore strip viability.

Team members constructed shelves inside the trailer to hold the packages for each fumigation event. Hooks were secured onto the shelves on which the spore strip arrays were suspended. Thus, the arrays were closely co-located with the packages being treated. Other spore strip locations included commercially available shipping boxes, the flaps of the boxes, and the plastic pouch of cardboard mailers. All spore strips were from the same lots used in the decontamination of the Hart Building, which helped to document the efficacy of the process in the Daschle suite and HVAC system, where the concentration of ClO_2 gas was less than optimal.

At the end of each run, START personnel removed the spore strips from the trailer using sterile gloves and tweezers. They placed each spore strip into a pre-labeled coin envelope, which was then sealed and placed in a re-sealable plastic bag. The first team then passed the samples to a team member located in the decontamination chamber. The team member immediately placed the samples into a new, re-sealable plastic bag. This bag was then passed to an additional team member in the dress-out area, where the bag was placed into a third, re-sealable plastic bag.

Team members produced COCs that contained the unique sample identification number and location code for each spore strip, as well as other information needed to process the samples.

Laboratory Analysis of Spore Strips

After arrival at the laboratory, spore strips were placed individually in liquid culture test tubes and observed for noticeable color changes. A colorimetric change from yellow to purple indicated that one or more viable bacteria was present on the strip. However, this analysis did not identify the species of viable bacteria present. Therefore, a culture of the bacteria present in the tube was prepared to identify the species of the bacteria.

During the Beltsville fumigation events, spore strip samples that yielded positive growth were plated to ascertain whether these results were caused by the presence of a viable *Bacillus* spore or adventitious contamination by other bacteria. By doing so, the plating analysis identified several false positives caused by cross-contamination, all of which occurred during the fifth and sixth runs.

Difficulties Encountered

While placing spore strip assemblages in the Daschle suite prior to fumigation, START personnel encountered physical obstacles (such as fumigation equipment, AHUs, electrical cords, fans) which restricted their access to some sampling locations. Therefore, some samples could not be placed in their pre-determined locations and crews were instructed to use professional judgement to place the folders as close to the planned locations as possible.

High humidity, temperature, and air movement during fumigation caused the tape on some of the sample folders to fail. Many floor and wall samples fell over or were knocked over by personnel traffic. In addition, two samples placed in the hallway and mail room were not found by teams.

During the fumigation events at Beltsville, EPA identified several "false positives" (as indicated by positive test results on NC spore strips) in the data for *B. subtilis* spore strips. SwRI evaluated several explanations for the contamination of the strips and concluded that the process for handling the strips did not create an adequately sterile environment for spore strip preparation. ERRS and START personnel were faced with many difficulties when they attempted to minimize cross-contamination while handling the strips.

Successes

Use of spore strips during the fumigation events was successful. The process of preparing, placing, removing, and analyzing the strips improved during each decontamination event. Spore

strips were an integral part of ClO_2 fumigation, which enabled EPA to assess the effectiveness of each treatment.

Lessons Learned and Recommendations

The process of preparing the spore strips was tedious because an individual unique identification number was assigned to each spore strip, which was placed individually into a file folder. In the future, it would be beneficial to request that the spore strip manufacturer print unique identification numbers on each strip. This would minimize the time needed to prepare the strips and avoid any contamination resulting from handling each strip individually. In addition, it would also be beneficial if the manufacturer enclosed the spore strips in a pre-labeled, double-layered tyvek sleeve. This arrangement would allow one layer to be removed following treatment to label the test tube, and the other to remain on the strip and placed inside the test tube for analysis.

Another lesson learned while preparing the spore strips was that placing a piece of paper in the middle of the file folder before and after fumigation posed a threat for contamination, which would cause false positives if the strips were not cultured. One possible recommendation is to use a glass ampule rather than a glassine envelope to enclose the spore strips, which would limit the ability to contaminate the spores present inside.

Due to the large volume of spore strips required for analysis after the Daschle suite fumigation, the EPA was prompted to search for an additional BSL3-level laboratory that could conduct spore strip preparation and analysis. In the future, EPA recommends that the laboratories as well as the manufacturers be identified up front, thus ensuring that the strips are produced and analyzed according to EPA's specifications.

EPA identified several inaccuracies in the steri-chart data. For example, a steri-chart would result in no growth on the 10^4 and 10^5 strips, but demonstrate positive growth on the 10^6 strip

followed by negative growth on the 10^7 strip. Later, EPA determined that this "jump" in the results was caused by inconsistencies in the concentration of the spores on each strip (caused by a clump of spores). There were also similar inconsistencies in the spore strip data, indicating that the concentration of spores on each strip is not always uniform. It is important in the future to use spore strips from the same lot to minimize discrepancies caused by non-uniform concentrations on the spore strips.

During the Daschle suite fumigation, EPA used approximately one strip per every square foot. Later, EPA determined that too many spore strips were used during the fumigation of the Daschle suite and HVAC system. The current protocol of assessing the effectiveness of decontaminating areas with paraformaldehyde, for example, requires only one strip per 100 square feet. It is recommended that EPA develop a standard number of spore strips to use during ClO_2 fumigation that can achieve a high level of confidence in the data without using too many strips.

The same types of spore strips were used during fumigation with ClO_2 gas as those used with EtO. However, the strips were specifically designed for use with EtO gas. Unfortunately, the glassine sleeve on these strips dramatically slowed the ClO_2 gas from reaching the spores, therefore resulting in an underestimation of the effectiveness of ClO_2. EPA recommends using different spore strips designed for ClO_2 rather than for EtO; specifically, strips could be enclosed in tyvek sleeves to allow for better contact time between the ClO_2 and the strips.

4.4.4 Off-Site Decontamination

The decontamination of the Capitol Hill Complex office buildings required the removal of numerous items from the buildings for off-site decontamination (Section 4.4.1). Off-site decontamination involved the decontamination of these items, including:

- Critical Items
- Vehicles
- Artwork

- Mail in drums
- Large office items

EtO was used to decontaminate the bagged and tagged items; other methods were used on the remaining items. EPA used spore strips to measure the efficacy of decontaminating with EtO; the strips contained various species of *Bacillus* bacteria to serve as surrogates for anthrax (*B. anthracis*). Specialized chambers were built in which START and ERRS personnel prepared the spores strips, placed them inside bags containing critical items, and removed them following treatment with EtO. After the strips were sent to the laboratory, the results were analyzed to determine if additional decontamination was needed.

The following subsections describe off-site decontaminations activities (Section 4.4.4.1), and the use of spore strips to measure the success of using EtO for decontamination of critical items (Section 4.4.4.2).

4.4.4.1 Off-site Decontamination Activities

The following subsections describe the sequence of events, difficulties encountered, successes, lessons learned, and recommendations related to off-site decontamination of critical items, vehicles, artwork, drums of mail, and large office items.

Sequence of Events

Off-site Decontamination of Critical Items

Initially, EPA established three categories of items. Critical items were to be bagged, tagged, and removed for decontamination and ultimately returned to their proper offices and owners. Non-critical items were to be disposed, and a third category of items were to be bagged and tagged for later disposition, whether decontamination or disposal. Office staff were asked to identify critical items that should be removed for off-site decontamination. Critical items originally were

defined as items that are either critical to congressional business operations or personal effects of significance.

EPA consulted with representatives of the USAMRIID and the Steris Corporation about the possible methods of decontamination. Paraformaldehyde and vaporized hydrogen peroxide were considered as alternatives. It was concluded to treat items at a facility in Richmond, Virginia using fumigation by EtO. EtO is an industrial chemical used in sterilizing medical items, fumigating spices, and manufacturing other chemicals. Pure EtO is a colorless gas at room temperature and a mobile, colorless liquid below 54°F. EtO has been registered and licensed by EPA for use as an antimicrobial pesticide since the 1940s. EPA has classified EtO as a Group B1, probable human carcinogen. EtO kills microorganisms by denaturing their proteins and subsequently modifying their molecular structure. Although EtO is not currently registered for use specifically against anthrax spores, EPA determined that emergency conditions existed which necessitated its limited sale, use and distribution for this purpose. At the conclusion of its review of cleanup options, EPA issued two crisis exemptions: one allowing EtO to be used in fumigating items retrieved from congressional offices that were potentially contaminated with anthrax, and a second allowing EtO to be used by the U.S. Department of Justice (DOJ) to test the fumigation process for mail received by the DOJ that may have been contaminated with anthrax. EtO was permitted to be used only according to the specific guidelines and procedures of the approved "Capitol Buildings Incident Retrieved Off-site Decontamination Plan" and the "U.S. Department of Justice Mail Sterilization Test, EtO Method." Sterilization Services, Inc., located in Richmond, Virginia, was selected as the contractor to perform the fumigation of critical items removed from the Capitol buildings.

Critical items were being bagged, tagged, and stored until a method of sterilization was identified. Once the method and location of treatment was selected, the EPA met with the Virginia Department of Transportation (DOT) to discuss transporting the bags of items from Washington, DC to Richmond. The DOT approved this transport by issuing an exemption.

Items were transported by a licensed medical waste hauler accompanied by a police escort. Contingency plans were developed prior to transport in the case of an accident.

The fumigation contractor treated the bags of critical items in batches; each batch required about 24 to 48 hours of contact time. After fumigation, bags were stored in conex boxes in the Botanical Gardens. Spore strips were removed from the bags and sent to SwRI and Dugway Proving Grounds laboratories for analysis. If positive spore strip results were found, the bag of items was sent back to Richmond for a second fumigation. Critical items that had been successfully fumigated were sorted by suite and stored in Conex boxes.

Criteria for releasing the items were developed that required additional aeration and subsequent monitoring of the items to ensure that no residual EtO remained at levels above the Occupational Safety and Health Association (OSHA) permissible exposure limit of 1.0 ppm over an 8-hour, time-weighted average. Data provided by the Library of Congress regarding EtO fumigation indicated that paper and plastic items retain significant levels of residual EtO that can off-gas at levels greater than the OSHA standard. Initial sampling of the fumigated items concurred with this data. EPA, with support from the FDA, decided that the items must be re-aerated prior to release to their respective owners. Critical items were shipped to the USDA Agricultural Research Center in Beltsville, Maryland for re-aeration. Release criteria for paper items were approved in February, and criteria for releasing non-paper items were approved in mid-March. Beginning in February, aerated items were returned to the Capitol area and stored until they were released to their respective owners.

Critical items were inventoried after re-aeration and before their release to their respective owners. The inventory process began in late February, and continued through mid-April. The items were removed from the bags and placed into cardboard boxes. The contents of the boxes, including the name and condition of each item, were recorded on an inventory tracking sheet. Originally, all items from the same suite would be grouped into the same return box. However, after the first couple weeks of inventory it was necessary for all paper items and clothes to be

separated into boxes of their own. The reason for this change was that in mid-March paper items had been cleared by EPA and FDA to be returned as soon as they were sufficiently re-aerated. Clothes were separated because it was speculated they might be sent for professional dry-cleaning. Soon after, computer mice, keyboards, cosmetics, medication, and food items were also removed and set aside for disposal. After the inventory was complete, the House of Representatives requested that all electronic items belonging to them be removed from the return boxes and disposed of. As a result of these changes, the inventory database required many revisions.

To prepare for the process of returning critical items, a QC procedure was implemented where each box was opened and the contents checked against the inventory database. During this process, items from the same suite were consolidated and the inventory database was updated as necessary to reflect any changes. The return of critical items concluded in mid-April.

Off-site Decontamination of Vehicles

Contaminated vehicles were decontaminated using HEPA vacuuming and treatment with bleach and water. CPBS personnel drove the vehicles to the Ford Building Parking lot, where contractors decontaminated them.

Off-site Decontamination of Artwork

To handle the delicate nature of some of the art in offices, a special artwork curator was contracted to identify important artwork, remove and treat it. Art was hand-cleaned, HEPA vacuumed, and then sampled to verify cleanliness.

Off-site Decontamination of Mail Drums

Drums of mail were sent to the P Street Warehouse for storage. Ultimately, Senate mail was sent to the Brentwood facility before being shipped to Lima, Ohio for irradiation. House mail was incinerated. In addition, about 4,000 mail packages were sent to Beltsville, Maryland, to be fumigated with ClO_2 gas.

Off-site Decontamination of Large Office Items

Items such as mail sorters, mail strapping machines, less valuable artwork, and mail carts were sent to the P Street Warehouse for storage and treatment. These items were HEPA vacuumed and then cleaned with ClO_2 liquid. Some of these items were ultimately returned, while others were disposed of properly.

Difficulties Encountered

Off-site decontamination involved the initial bagging, tagging, and toting of approximately 3,200 bags of critical items. The original intent to designate only certain items as critical led rapidly to a larger number of items becoming critical items. For example, mousepads, coffee mugs, music CDs, and expendable office items like staplers, hole punchers and paper clips were bagged, removed and treated along with other, more valuable items. Bags of items were heterogenous; electronic equipment were mixed in the same bags with papers and Rolodexes. The heterogeneity of the contents of bags eventually led to difficulties in establishing an acceptable level of decontamination. Because the bags contained diverse types of materials, the International Organization for Standardization (ISO) standard for EtO fumigation as a sterilant could not be used to measure the success of sterilization. In addition, fragile items were destroyed due to many stages of shipping and handling.

Problems also existed in labeling the bags of critical items. Because of the large scope of the bagging and tagging operations, and the pressure to decontaminate the buildings as quickly as possible, there was not sufficient time to label bags with detail. The sticker labels frequently fell off the bags, making it almost impossible to track those bags through the process of decontamination.

An inventory database was established about halfway through the placement of spore strips, which was an inefficient point of entry for the database to be created. In addition, changing requests of the House and Senate to separate items during the inventory process prolonged the inventory process. For example, the House requested all electronic equipment be removed and set aside for disposal, while Senators sent their staff members to the inventory location to look through every box and determine what should be returned and what should be discarded. These disparate methods of inventory were inefficient and complicated the inventory, QC, and return processes.

Throughout the overall response, space in the Capitol area was at a premium. It was difficult to find space to store the large quantity of critical items after they were removed from offices and before they were shipped to Richmond for sterilization.

Response personnel had no prior experience decontaminating items that potentially contained anthrax. There were no cleanup criteria or established procedures for treating items from an occupational setting contaminated with anthrax. Due to the heterogeneity of bags of critical items, the ISO standard for sterilization with EtO could not be used. Thus, the nature of responding to anthrax in an occupational environment was a completely new challenge, one that was dealt with as the response evolved.

Successes

Off-site decontamination was successful; all the critical items, vehicles, and drums of mail were decontaminated and returned to their proper owners. In addition, cooperation from industry was very helpful; several laboratories were generous in lending their expertise and knowledge, while other companies donated supplies or designed new materials to facilitate the fumigation of the bags. The cross-cutting cooperation of the EPA, FDA, Virginia DOT, along with members of industry, contributed greatly to smoothness of the off-site decontamination of critical items.

Lessons Learned and Recommendations

Off-site decontamination was complicated primarily by the large quantity of critical items (3,200 bags). Had the definition of critical items (items critical to congressional business or personal effects of significance) been adhered to, many of the difficulties encountered would have been prevented and the overall decontamination of the affected offices may have moved more efficiently and quickly to completion. In the future, it is recommended that the removal of critical items be minimized, and that disposal of potentially contaminated items be maximized. As it was, many items that had been bagged, carried to storage, shipped, sterilized, stored again, re-aerated, and inventoried, were at the end of the process identified as non-critical and thrown away. Further, a smaller amount of critical items would have:

- Allowed placement of similar items into the same bags, thereby allowing them to be sterilized according to existing ISO, FDA, and OSHA standards, and also hastening the inventory process dramatically.
- Reduced the problem of limited space to store and inventory items.
- Required less time to label bags, affording more time to be devoted to a more precise system of creating and attaching labels.
- Required less commitment of resources (personnel, bag materials, spore strips, truck loads).

Understanding that the offices, files, and electronic equipment of Senate and House members may contain sensitive information, it is recommended that electronic means of retrieving data are

explored. Exploiting electronic alternatives would have allowed computers to be disposed (which ultimately were damaged during the handling, fumigation, and re-aeration processes) and critical electronic information to be retained.

The process of off-site decontamination, like the entire response to the anthrax contamination, was a learning experience. Should a similar response be mobilized in the future, procedures were developed that could be replicated and implemented again.

4.4.4.2 Spore Strips Used During Ethylene Oxide Fumigation

The following subsections describe the sequence of events, difficulties encountered, successes, lessons learned, and recommendations associated with the use of spore strips to measure the efficacy of EtO to decontaminate critical items.

Sequence of Events

Spore strip placement (prior to decontamination), and removal (after decontamination) from bags of critical items occurred from early December through mid February. During this time, approximately 3,200 bags of critical items were treated with EtO gas at the designated treatment facility in Richmond, Virginia. The spore strips were comprised of bacterial spores deposited on a cellulose acetate media wrapped with permeable glassine paper. NC strips, which contain no viable spores, were used to determine whether cross-contamination of the spore strips had occurred during their placement or removal. Each bag of critical items contained five spore strips, containing *B. subtilis*, one containing *B. stearothermophilus*, and one NC strip, each placed in an individual envelope.

Preparation and Placement of Spore Strips

Specialized containment enclosures were constructed in the southern atrium of the Hart Building and in the northwest corner of the P Street Warehouse specifically for placement of spore strips into bags of critical items. The enclosures were composed of four connected chambers in a linear design to ensure that items would be moved from contaminated areas to clean areas. To facilitate the process, the bagged material was reopened, spore strips were inserted, and the items were rebagged and re-containerized for shipment to the designated facility. START personnel were responsible for spore strip placement, labeling, and documentation. ERRS personnel conducted the majority of the material handling tasks, including bag opening, placement in primary and secondary bags, and bag decontamination.

Spore strip placement was performed in Chamber 1. ERRS personnel for Chamber 1 were dressed in Level C PPE with Powered Air Purifying Respirator (PAPR) and Kevlar cut resistant gloves. Each person placed three or four vertical slits through the inner and outer bags with a utility knife. The person then carefully removed the gooseneck closure from the outer bag followed by the gooseneck closure from the inner bag. The ERRS person then handed the bag to the START person assigned to Chamber 1. The START person placed the spore strips into the bag, then passed the bag to the ERRS person assigned to Chamber 2, where bagging, sealing, and bag decontamination were accomplished.

A *B. stearothermophilus* strip was placed on the bottom of each bag of critical items, the NC strip in the middle, and the two sets of *B. subtilis* were placed on top. A detailed COC was initiated for each bag of critical items, identifying each spore strip within the bag as a QA/QC measure.

Removal of Spore Strips

Another specialized containment enclosure was constructed specifically for spore strip removal at the Botanical Gardens location. The enclosure was designed similarly to the containment structure constructed in the Hart Building for spore strip placement. The enclosure housed a series of roller tables to minimize handling of the totes and personnel fatigue.

After critical items were returned from the fumigation facility, they were removed from the Gaylord boxes and staged in Conex boxes in their original plastic totes, which were sent along a roller table for spore strip removal. After the strips were removed, the bags were staged in Conex boxes until analytical data became available.

The process began in the first chamber of the strip removal facility. The plastic ring and tyvek valve cover were cut out of the bags, and the bags were opened to allow access to the critical items. A slit was then made in the bottom of the double bag, and a 4-inch vacuum line was inserted to evacuate any residual EtO. Once the bags were vacuumed for 3 to 4 minutes, they proceeded along a roller table to Chamber 2.

Once in Chamber 2, START and ERRS personnel removed the spore strips and placed them into a small zip-lock plastic bag. That bag was then placed inside another zip-lock plastic bag and a unique tracking number was affixed to each bag of spore strips, as well as to the bag of critical items from which the strips came. Finally, the spore strips were packed and shipped in compliance with the IATA dangerous goods regulations.

Analysis of Spore Strip Results

Spore strip analysis required a seven-day culture period to determine if fumigation achieved the necessary kill rate (Section 4.4.3.2). Upon receipt of the analytical results, all items that failed fumigation (as indicated by spores strips that demonstrated growth within seven days) were

separated out and sent back to the spore strip placement facility. New spore strips were inserted and the critical items were sent for a second round of EtO fumigation. Critical items that had successful fumigation treatment were sorted by suite and staged in conex boxes, ready for transport to the USDA facility in Beltsville, Maryland for the re-aeration process.

Difficulties Encountered

START and ERRS personnel encountered several problems when handling the spore strips. The process was tedious because each strip needed to be assigned an individual unique identification number. Locating the strips after EtO fumigation was another difficulty because the personnel removing the strips were not informed where the strips were placed in each bag (inside a drawer, vase, etc). Another problem was that the tracking database was not implemented until halfway through the strip placement process, requiring a reiteration of the process. Finally, the process was slowed down considerably by inserting spore strips into bags that were later disposed because they did not contain critical items; instead, they contained "trash" items, such as food, blank paper, and expendable office items.

Successes

Using spore strips to test the efficacy of EtO was a success. The strips were good indicators of the kill rate achieved by the EtO gas because they were designed primarily for use with that gas. The project provided information on the unprecedented use of EtO for decontaminating the wide variety of items collected from offices on Capitol Hill. Another success was the interaction between the laboratory and the on-site personnel. The constructive feedback helped EPA develop more information for use in response to any future biological attacks.

Lessons Learned and Recommendations

Many lessons were learned based on the experience of using spore strips during fumigation with EtO. First, repeating the fumigation process based only on the initial, non-specific spore strip results created some additional work that was not necessary. It is therefore recommended that all initial spore strips that result in positive growth are cultured and the species of bacteria identified. This process will decipher between positive *Bacillus* bacterial growth and any contamination that occurred through the handling process.

Second, START and ERRS personnel had difficulty locating spore strips within an individual bag of critical items. After decontamination with EtO, they spent significant time locating the strips, thus increasing handling of the critical items and slowing down the process. It was later implemented that all spore strips were affixed to a string and flagged with a bright colored tail, thus making it easier and faster to locate the strips.

Third, the facility used for removing spore strips was located in a highly public area, thus drawing unwanted attention. In the future, such activities should be located in less visible areas that are secured by requiring proper identification for entry.

Other recommendations include using a larger variety of *Bacillus* species to achieve better diversity with results; require that the manufacturer of the strips customize them with unique identification numbers to reduce the time and error rates involved in preparing the strips (bar codes); use spore strips from the same lot to maintain consistency when analyzing the results; identify the laboratories early, to assure that they are BSL 3-qualified; and better define and enforce the classification of critical items, thereby increasing the efficiency of spore strip placement and EtO fumigation.

4.5 Community Relations

This following subsections describe the sequence of events, difficulties encountered, successes, lessons learned, and recommendations regarding community relations.

Sequence of Events

Following the closure of the Hart Building, Capitol Police took responsibility for community relations and appointed LT Dan Nichols as the point of contact for all community relations issues. The Capitol Police addressed multiple issues, including the death of two postal workers from the Brentwood Post Office, antibiotics and other health issues, and the fumigation activities associated with the Hart Building. These issues typically were relayed to the public through press releases, press conferences, and public meetings. The congressional community received daily briefings and updates through the Senate web site.

The Capitol Police were responsible for external communication with members of Congress, congressional staffers, media, and residents in neighboring communities. The EPA was responsible for maintaining adequate communication internally among EPA OSCs, ICS leaders, and site responders. The following subsections describe issues regarding internal communication.

Difficulties Encountered

There were several difficulties concerning internal communication. A lack of coordination within the response team regarding community relations led to complications, because on-site personnel received varying levels of information. In addition, site responders were sometimes able to obtain more information from the Internet than from direct communications within the response team organization.

Another difficulty resulted from the large number of requests for special operations submitted by members of Congress and their staff. These interruptions were frequent and time-consuming, which meant the OSCs were taken away from directing processes and solving problems. Better internal communication would have helped prioritize and schedule these tasks.

Successes

Although EPA was not the lead agency for community relations, a media strategy was developed to inform the media about EPA's role, thus allowing OSCs to focus most of their attention on the activities of the response. During the response, the media reported accurate accounts of EPA's involvement at the Capitol Hill Site. Another success, especially considering the magnitude of the response, is that there were no leaks of sensitive or inaccurate information from EPA or its contractors to the media.

Lessons Learned and Recommendations

One of the key lessons learned regarding internal communication is to place planning and operations personnel at the same location, which was not the case during this response. Having these two teams together would have improved internal communication and both groups of personnel would have received more consistent and up to date information.

Another recommendation involves communication between shifts. Better information transfer between shifts would have made transitions more efficient. Planners and incoming personnel would have known what tasks had been completed and any complications or problems that occurred. Due to the intense nature of the response, another recommendation is to improve internal communication regarding physical stresses such as fatigue and exposure anxiety.

4.6 Disposal

Three primary waste streams were generated during the Capitol Hill Site response and each type was managed differently. The three waste streams included:

- Debris and solid waste
- PPE
- Decontamination water

Debris included solid waste (sofas, carpet, curtains, and trash). PPE consisted of used equipment from the site. Decontamination water resulted from decontamination of personnel and equipment. Wastes were staged at the Incident Command Center on D Street until they could be properly disposed.

The following subsections describe the sequence of events, difficulties encountered, successes, lessons learned, and recommendations associated with the disposal of the three waste streams listed above.

Sequence of Events

The initial plan addressed disposing of wastes (primarily debris, solid waste, and PPE) at a Resource Conservation and Recovery Act (RCRA) hazardous waste, permitted incinerator. However, hazardous waste treatment, storage, and disposal facilities are not permitted to handle anthrax-contaminated materials because these materials are classified as medical wastes. Additionally, a hazardous waste incinerator is not suitable for anthrax-contaminated wastes, because its continuous feed rates may not allow enough time to ensure the destruction of all anthrax spores. Therefore, EPA determined that medical incinerators should be used to dispose of solid waste, debris, and PPE because these incinerators employ a batch process with higher temperatures and longer contact times.

Because there are no medical waste incinerators in Washington, DC, EPA worked closely with the states of Maryland and Virginia to identify facilities that would accept the wastes generated during the Capitol Hill Site response. The State of Maryland granted special permission for Fort Detrick to accept wastes from Capitol Hill. Prior to that action, the disposal facilities at Fort Detrick had only disposed of wastes that were generated on-site. Fort Detrick was selected because it has two municipal waste and two medical waste incinerators, is a government facility, and is located near Capitol Hill. Some waste also was disposed at an incineration facility in Norfolk, Virginia.

Debris and PPE were primarily disposed of at Fort Detrick, Maryland. The incinerator ash was removed and disposed according to Fort Detrick SOPs and existing permits with the Maryland Department of the Environment.

Shipping began on November 26 and was limited to one 30-cubic-yard truckload per work day. Throughout the response, nearly 300,000 pounds of material classified as medical waste were sent to Fort Detrick for disposal. Large objects were disposed of in the municipal incinerator. These objects were disposed of as solid waste but transported as medical waste. When a large amount of solid waste (about 300 cubic yards of mainly furniture) was removed from the P Street Warehouse and the Hart Building, some was shipped to a commercial, medical waste incinerator in Norfolk, Virginia.

A DOT exemption was issued for transporting solid waste, debris, and PPE using a bulk outer container. The exemption was approved because response team personnel demonstrated that the bulk outer container was equivalent to the standards embodied in the regulations. Medical waste is usually transported in small packages. DOT requirements for infectious wastes consist of double-bagging (or double-wrapping with polyethylene sheeting and tape if the waste is too big for a bag), securing with tape, and placing it in an approved outer bulk container. Approved outer bulk containers include boxes, Gaylord boxes, trailers, caster carts, cans, and roll-off bins.

Composition was also a factor affecting where the waste could be properly disposed. EPA identified options for items that Fort Detrick could not accept, such as metal and polyvinyl chloride (PVC), because they would negatively impact the incinerator. EPA worked with Maryland, Virginia, and Florida to obtain approvals. Metal items, including empty 55-gallon drums, X-ray machines, metal furniture, and cabinets were sent to a facility in Florida, where they were decontaminated using steam. At the Micromet Florida facility, the metal objects were decontaminated and sampled to verify that the decontamination procedures were effective and that the metal could be used for recycling. About 700 drums were transported to Florida using the same DOT exemption issued for shipment of solid waste, debris, and PPE to Fort Detrick and the facility in Norfolk. Following decontamination with steam, the metal was given to scrappers that had been pre-approved by the EPA. PVC from decontamination structures also was not disposed of in the medical incinerator at Fort Detrick due to composition. The PVC materials were disposed of in municipal incinerators at Fort Detrick.

Decontamination water was generated during the decontamination of personnel and equipment. The decontamination water was stored in 55-gallon drums while on-site, then transferred to tanker trucks for transportation to Fort Detrick. This waste was considered non-regulated. Over 14,000 gallons were sent to Fort Detrick for treatment. This waste stream was disposed at the wastewater treatment facility at Fort Detrick. Bio-testing and pH measurements were conducted on the wastewater (one composite sample was collected for each building) because the sludge from the wastewater treatment facility is usually land-applied. Although the wastewater was confirmed negative, it also passed through a steam-sterilization unit before entering the publicly-owned treatment works (POTW) to address public perception The decontamination water was gravity-fed into the system. Gloves and other debris from the decontamination lines periodically clogged the intake pipes and had to be removed and land filled.

The following wastes were disposed of as traditional RCRA wastes:

- Fumigation scrubber water (as caustic)
- Lab pack materials
- Paints, oils
- Electronic parts and coolant from X-ray machines

Plastic bags used for carrying critical items were disposed of as non-hazardous waste because they had been decontaminated along with the critical items. After decontamination, critical items including electronics that were either broken or not actually critical and other non-hazardous materials were disposed of as regular solid waste.

Difficulties Encountered

Many POTWs and commercial facilities would not accept potentially anthrax-contaminated materials due to a lack of regulations for the transport and disposal of anthrax contaminated materials on an emergency basis. Another difficulty was the logistics of the site; limited room was designated by the CPB for storage and staging of wastes.

Successes

Building on prior relationships, EPA maintained good communication with state and federal regulators (Maryland, Virginia, District of Columbia) to develop options for disposal. Maryland and Virginia and the District of Columbia were active participants, which helped move the process along. The availability of Fort Detrick was crucial to the success of the operation. Ultimately, all waste was disposed properly and effectively.

Lessons Learned and Recommendations

Clear and open communication among federal, state, and local agencies and facilities was crucial to the success of disposal. Sufficient time should be allowed to develop relationships and resolve issues. The disposal community should anticipate future nuclear/biological/chemical response needs (to inventory disposal, transportation, and treatment alternatives). Guidance should be developed on addressing such wastes, since standard RCRA hazardous waste disposal options most commonly do not apply to all potential situations. Significant outreach and education efforts were extended to treatment and disposal facilities; however, additional outreach to a larger segment of such facilities should be conducted to reduce their reluctance to accept wastes and increase their willingness to assist in similar situations in the future.

4.7 Health and Safety

The EPA Health and Safety Plan (HASP) addressed issues regarding the proper level of PPE, fit testing, medical monitoring, and decontamination lines. The Capitol Hill Site response was unique from a health and safety perspective because it was the first time EPA was faced with anthrax as a contaminant, therefore making it necessary for EPA to implement new health and safety measures.

The following subsections describe the sequence of events, difficulties encountered, successes, lessons learned, and recommendations associated with health and safety activities that occurred during the response.

Sequence of Events

On October 17, the USCG's National Strike Force established site safety protocols upon their arrival on-scene and immediately drafted an initial site-specific HSP and Doug Fox (EPA) was

designated as the Health and Safety Officer, Doug Fox (EPA). NIOSH had already conducted entries prior to drafting the original HSP.

On October 18, Doug Fox temporarily suspended entries into buildings for a brief period pending resolution of evolving discussions concerning the type and level of PPE needed, respiratory protection levels, and the type of decontamination that would be most effective. EPA representatives Skip Weisberg and Brian Kovack revised the HSP based on these discussions. In addition, on-site fit testing for OSC's was initiated which was later expanded to include a requirement for on-site fit-testing for all entry personnel.

On October 19 and 20, Navy personnel arrived on-site in response to a verbal agreement from the Capitol doctor to perform medical monitoring. CDC and the Navy recommended designating the use of PAPR's in the site specific HSP. EPA established a health and safety team, which included Vince Zenone as the site safety officer, Brian Kovack as the Public Health Advisor, and Skip Weisberg as a site health and safety officer. The USCG's National Strike Force was designated as Division and Group Supervisors for oversight of compliance with the EPA's HSP for entry team operations during the Emergency Phase of the operation. Upon transition to Remediation Phase, the USCG's National Strike Force assisted EPA OSC's as directed on a building by building basis.

The EPA health and safety officers issued 15 revisions of the site specific HASP during the response. When contractors originally mobilized to the site, they were required to attend a health and safety briefing, read the HASP, and sign it. Contractors were not required to sign revisions to the HASP that addressed new protocols for decontamination and medical monitoring.

Decontamination Lines

In mid-November, EPA established the first enclosed decontamination line, prompted by the results of the re-aerosolization study proving that the anthrax spores could become airborne

during response activities. During the response, the east building entrance of the Hart Building was converted to a staging area and decontamination zone (segregated chambers where personnel and equipment were sprayed with a diluted bleach solution). Sampling teams entered and exited the building through this area. A supplementary decontamination zone, which included spray pools and equipment storage, was established at the fifth floor entrance to the Daschle suite. The sixth floor of the suite could be reached only by stairs accessed from the fifth floor of the suite.

Decontamination lines were originally established using a mixture of one part household bleach to nine parts water in tubs for decontamination. Showering facilities could have allowed the use of water or a much weaker bleach solution to remove anthrax spores from the PPE, without the need to kill the spores. However, showers were not used initially, because the locations of the decontamination lines were changing frequently. They were not used later because the established process was adequate and because showers would have produced additional wastewater, which would have presented issues regarding storage and disposal. Due to the lack of showering capabilities, the decontamination solutions were designed to be strong enough to kill all the spores that were potentially on an individual's PPE.

Health and safety officer Skip Weisberg became aware that the diluted household bleach solution was not effective enough to kill all spores within a reasonable time frame for decontamination lines. Therefore, he researched options to improve the efficacy of the solution and chose to add vinegar to the chlorine solution, which lowered the pH of the solution to between 6 and 9. Lab results showed that the vinegar doubled the rate at which spores were killed by the decontamination solution. However, vinegar also increased the evolution of chlorine gas, making it too hazardous to prepare large batches of the solution; therefore, only small batches were prepared.

Medical Monitoring

In early December, medical monitoring was added to the HASP. Prior to its inclusion into the HASP, a medical monitoring program was in effect on-site, overseen by the USCG. According to the plan, the public health physician was not permitted to treat any non-federal workers; therefore, EPA classified all contractors as "agency site workers."

On December 7, EPA drafted and posted a list of the medical monitoring steps. The list specified the level of PPE to use, organized fit tests, and established a plan for distributing antibiotics.

PPE

The HASP required that individuals performing entries into the buildings wear Level C PPE. Level C was required for workers involved in bag, tag and tote operations and as sampling activities; these workers wore (PAPR) with full face pieces and HEPA filters. In addition, they wore disposable protective clothing with integral hood and booties as well as protective gloves. In November, the HASP was changed to indicate that workers be double-suited to protect from dermal exposure.

During fumigation activities, workers entering the building wore Level A PPE, which included wearing a self-contained breathing apparatus (SCBA) and a reusable Level B fully encapsulating protective suit. The gear had greater than a 480-minute breakthrough time.

Fit Testing

The health and safety officers performed approximately 1,800 respirator fit tests during the response. Individuals were also monitored for common medical conditions, primarily high blood pressure and heat stress. Any individual with high blood pressure was restricted from performing

an entry, therefore preventing possible health problems later. When heat stress was identified as the problem, entry times were decreased. The area was not cooled with fans because the circulating air could re-aerosolize anthrax spores.

Antibiotics

At the beginning of the response, all personnel making entries into the buildings were provided a 10-day supply of ciprofloxacin hydrochloride (Cipro). The Cipro made many people sick, so EPA began to distribute doxycicline and tetracycline. The doses were increased to 60-day supplies, advising that an individual should continue to take the antibiotics for 60 days following demobilization from the site. Every individual was monitored for potential side effects of using the antibiotics. Initially ambiguous and changing protocols and recommendations from Public Health officials as to the appropriate protocol for prophylaxis caused confusion and anxiety amongst workers.

Difficulties Encountered

Creating decontamination chambers caused a problem due to excess chlorine gas that was released from the ClO_2 liquid and bleach solutions used for decontamination of personnel. Prior to creating decontamination chambers, decontamination lines were out in the open and their locations frequently were moved. Many locations were identified as not adequate due to problems with accessibility and connections to contaminated buildings.

Adding vinegar to the solution resulted in a faster evolution of chlorine gas, making it too hazardous to prepare large batches of the solution. Therefore, only small batches of decontamination solution were prepared, which increased the likelihood of errors while mixing the solution.

Successes

Health and safety activities were successful overall in that none of the responders contracted any anthrax-related infections. In addition, the medical monitoring program was a success, because it screened workers who were not fit to enter the building under the given conditions. Emergency medical support was in place and ready, and no lost work time was reported due to injuries or illness during the response. The follow-up medical assistance program also was a success, despite the fact that it had never been implemented before.

Lessons Learned and Recommendations

Dissemination of Information

The dissemination of health and safety-related information was inadequate. Individual contractors held daily health and safety meetings; however, the EPA did not hold regular meetings with representatives from the contractors and other organizations to ensure that everyone was aware of any changes. Many contractors did not know the identity of the health and safety officer for the response; therefore, they did not know where to obtain information regarding the frequent changes that were made to the HASP. Mandatory formal site safety meetings, including a representative from each organization, are recommended for future response actions to discuss changes and updates on the site-specific HASP. In addition, HASPs for sites with unprecedented contaminants and/or exposure routes should address psychological health issues, such as exposure anxiety, associated with such responses.

Revisions to the HASP did not always incorporate the most accurate and updated information that was available at the site. In addition, no sign-off was required for revised HASPs. In the future, it is recommended that EPA obtain the feedback from key persons involved in the daily response activities.

Mobilization and Orientation

One minor incident occurred when two contractors were burned with bleach. They were unaware of the emergency procedures, which prompted personnel to call an ambulance unit to the site. It would have been beneficial to organize emergency support early in the response.

The mobilization of health and safety procedures and equipment could have been coordinated more fully. It is recommended that selected components of health and safety services be assigned to the public health service by mobilizing a disaster medical assistance team (DMAT).

The orientation of new site workers was inconsistent, resulting in several misunderstandings. Again, the status of health and safety procedures for all workers should be posted at a central location.

Medical Monitoring

When the task of medical monitoring was transferred from the Navy to a private contractor, the organization broke down. EPA therefore recommends implementing a more organized structure for health and safety during transitional periods.

Several fainting incidents occurred as a result of heat stress. Recommendations for preventing heat stress in the future include cooling the workers' wrists down, providing the workers with ice vests, allowing more time for proper temperature regulation, and/or providing mist generating units for people to walk through while suited up.

Decontamination Procedures

Three lessons learned were identified regarding the process of moving through the decontamination lines. First, the method of decontamination could be improved. An ideal

decontamination process, recommended by CDC, would have involved setting up showers for the workers to wash all spores off of their PPE, rather than attempting to achieve an adequate kill of the spores. Therefore, it is recommended that showers, along with a soap and water solution be the primary option for decontamination of personnel (the ability to provide proper disposal of the wastewater may eliminate this option at some sites).

Secondly, personnel decontamination procedures were not adequately enforced and followed. Decontamination solutions were not properly mixed, PPE was not removed correctly, and the decontamination lines were not maintained at a high level of quality. Therefore, it is recommended that proper measures be taken to enforce the procedures for mixing the decontamination solution, proceeding through the line, and maintaining of the integrity of the line (remove trip hazards, improve signage, etc). One option is to assign a person as decontamination supervisor to enforce these procedures. In addition, it is strongly recommended to initiate proper training for decontamination personnel and establish a dedicated decontamination team.

Third, adding vinegar to the decontamination solution created hazardous conditions due to the significant evolution of chlorine gas. Therefore, it is recommended that water showers be installed, or if that is not feasible, a different solution be used so fewer, larger batches can be prepared to lower the risk of errors while mixing the solution.

PPE and Supplies

The first lesson learned involved the availability of PPE. During the response, there was no process by which surplus PPE could be transferred efficiently between different organizations. To improve the efficiency of obtaining PPE, EPA recommends creating a localized source for equipment that would behave as a repository for PAPRs and other protective gear. Second, when reusable PPE was worn, it was not clear how many times the gear had been worn previously. Therefore, it is recommended to track the number of entries per suit to ensure the safety of the

worker wearing the PPE. Finally, only a few entries were possible each day, because of the time needed for responders to don double layers of PPE. Such time could be reduced by identifying or developing PPE that eliminates the need for double layers.

5.0 LESSONS LEARNED AND RECOMMENDATIONS

Lessons learned and recommendations specific to particular activities are presented in Section 4.0. All of these lessons learned and recommendations are valuable; however, three overarching recommendations were identified as the most critical to ensure more efficient responses in the future:

1. Develop a core group of personnel from multiple agencies, adopt an Incident Command System (ICS) and jointly train the group on the procedures of that ICS; this core group would be dedicated and available to respond to future criminal acts, terrorist acts, or national emergencies involving nuclear, biological, and/or chemical materials.

2. Extend indemnification provisions currently available to Department of Defense (DoD) and Federal Emergency Management Agency (FEMA) to EPA for specific responses involving criminal acts, terrorist acts, or national emergencies in order to facilitate contractor mobilization and participation.

3. Improve the efficiency and effectiveness of internal communication by Incident Command leaders and among EPA OSCs during large, long-term, multi-agency responses.

The three recommendations are discussed further in the following subsections.

Develop a Core, Multi-Agency Team Under a Common ICS

The response effort was a success, largely due to the concerted effort by all responders to maintain coordination between agencies and organizations. The USCG implemented an ICS, which was not fully effective because it was unfamiliar to many of the personnel and agencies that were involved in the response. Frequent personnel rotations also reduced the effectiveness of the ICS. Positions and priorities also changed frequently, which affected the efficiency of the response.

The EPA OSCs involved in this response recommend the development of a core group of personnel from multiple agencies. From examining the successes and difficulties of the Capitol Hill Site response, specific agencies and organizations could be selected as a core response group. The group would develop or adopt an ICS which would be implemented in similar future responses. Personnel in this group would be trained and certified in the procedures of the joint ICS. This group ideally would be dedicated to be available, to the greatest extent possible, for the entire duration of similar, multi-agency responses in the future. The group would train together and become familiar with representative organizations' roles and responsibilities. The development of such a group would likely:

- Make key personnel available to a response, from various pertinent agencies and organizations, whom are all familiar with the same ICS and operating procedures, thereby maintaining a permanent ICS throughout the response. Implementing and maintaining a permanent, functioning ICS would allow for increased multi-agency coordination and would minimize confusion and increase efficiency.
- Minimize the turnover of on-site personnel, thereby minimizing confusion and redundant activities.

Extend Indemnification Authority Beyond FEMA and DoD

Indemnification was a major issue regarding the response. EPA OSCs often found it difficult to secure the involvement of private companies because these firms requested some form of federal indemnification. Those companies required indemnification to protect them from the legal uncertainties that were involved in a response that was not consistent with their normally offered products and services. Therefore, EPA OSCs recommend extending to the EPA the indemnification provisions already available to FEMA and the DoD. Such provisions, drafted in language that would make implementing them only appropriate in the case of specific cases of criminal or terrorist acts, would then be able to be inserted into contracts. The new language likely would:

- Facilitate contractor participation and mobilization, thereby allowing EPA to maximize use of the resources available.

- Reduce time delays during the response by developing the language before the response is necessary.
- Clarify legal responsibilities and potential liabilities for private companies.

As learned from the Capitol Hill Site response, EPA responses to non-routine releases of hazardous substances can be extremely time-critical; therefore, EPA must have the ability to dispatch appropriate contractor resources as quickly as possible at the beginning of a response.

Improve Communication Among Incident Command Leaders and EPA OSCs

Another major difficulty that affected the response was internal communications by OSCs and incident command leaders. Internally within the response team, briefings were not held consistently, and poor communication affected most activities of the response, including health and safety, sampling, and decontamination. For example, a bulletin board would have been helpful for sharing information such as plan updates or revisions, or a master file could have been developed for each activity (i.e., health and safety, sampling, decontamination) to relay information between shifts or teams. In addition, information-sharing between agencies on selected topics critical to the response should be increased. For example, a portion of the classified information obtained by the FBI could have improved the direction of the initial response; however such information was not readily available to other members of the response. Although this information may have contained sensitive details or evidence, it may have been possible to share it in a controlled manner with a wider portion of the response team.

To improve internal communications, the following suggestions are made:

- Develop and adhere to a strict schedule of shift briefings. Strive to ensure that the same few key personnel are delivering the briefings in order to maximize consistency.
- Identify a physical location where notices, bulletins, updates, and memos, could be posted. Inform everyone of this location and encourage individuals to visit it frequently. Encourage the points of contact for each major response activity to use the location to post information.

- Develop and adhere to a strict schedule of multi-agency meetings and briefings, which would allow greater information sharing and more efficient identification of data gaps or overarching problems.

- Implement a properly functioning ICS.